THE JOURNAL OF GAS LIGHTING
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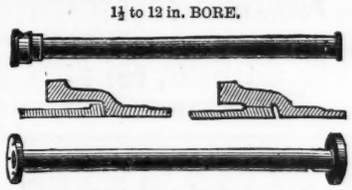

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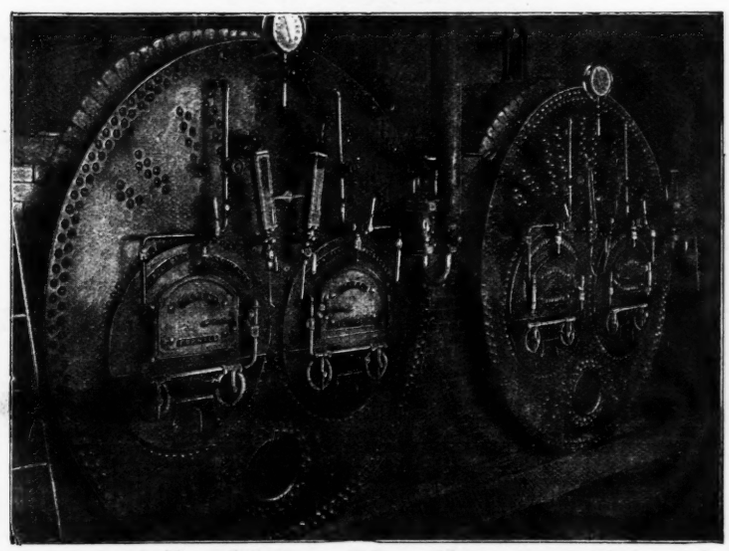

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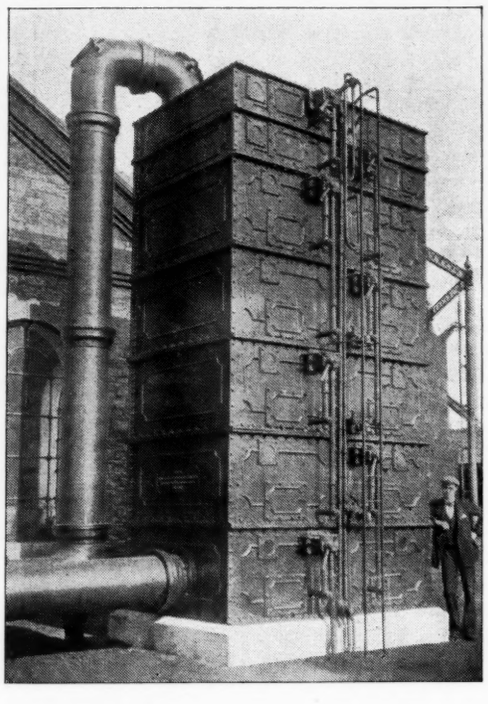

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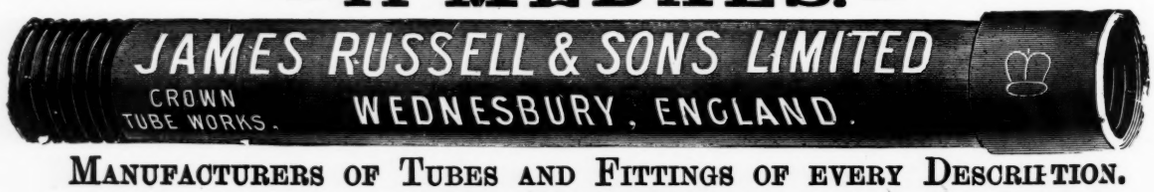

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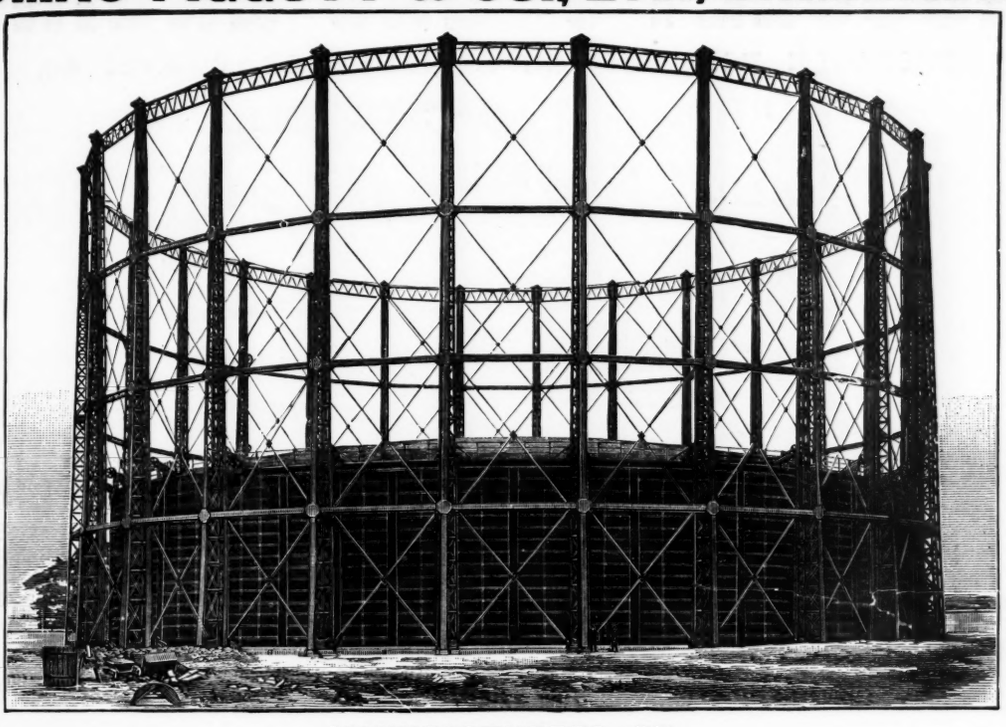

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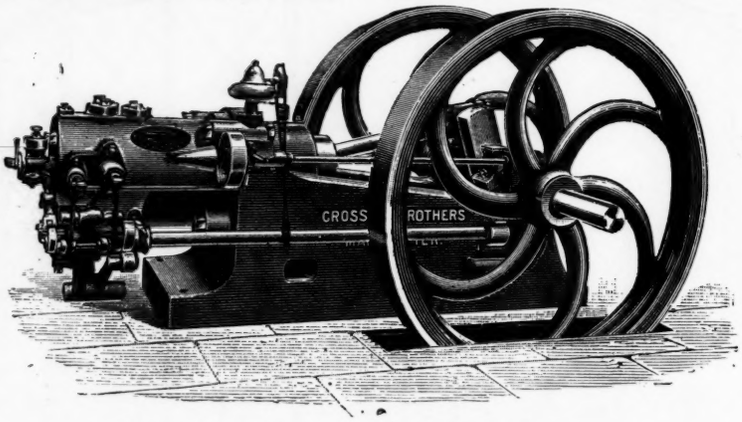

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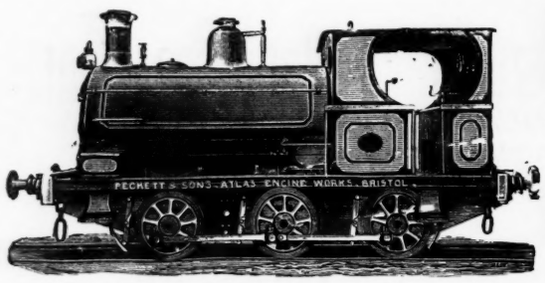

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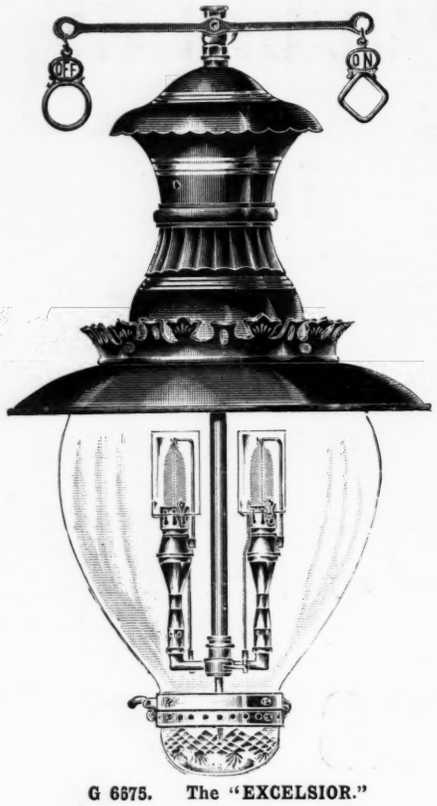

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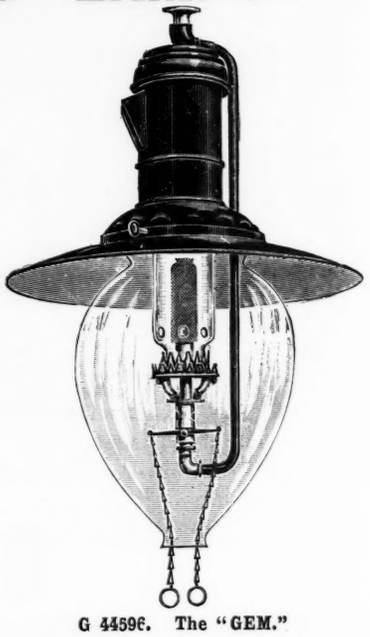

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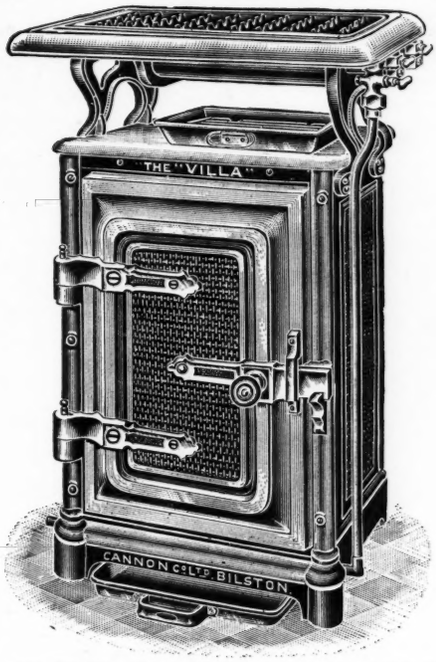

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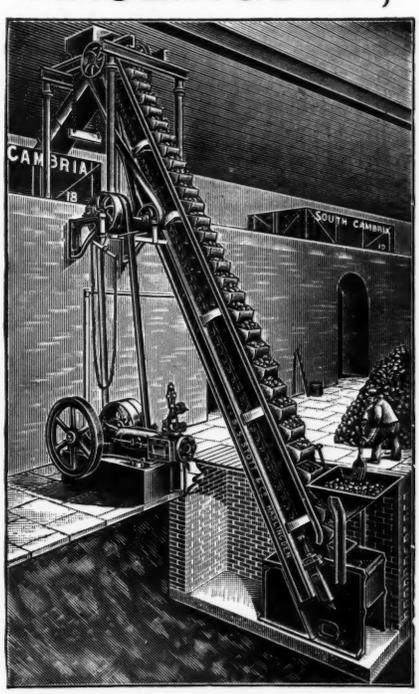

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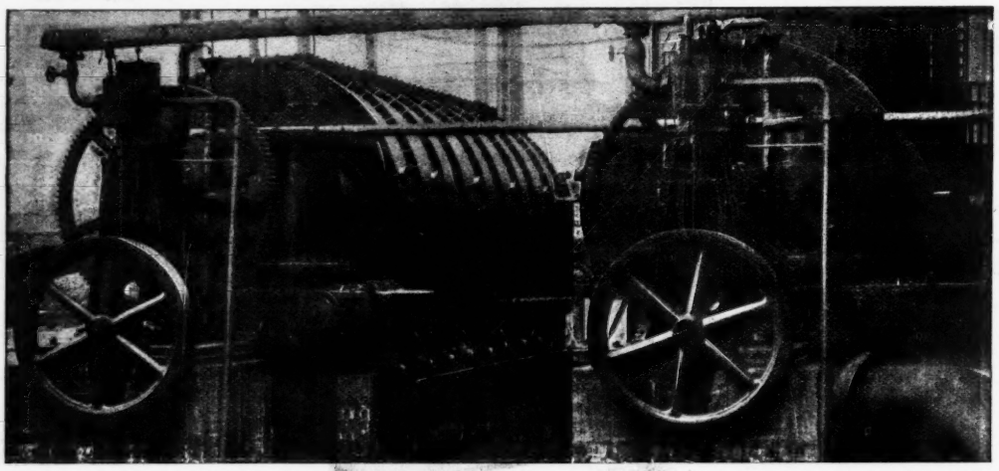

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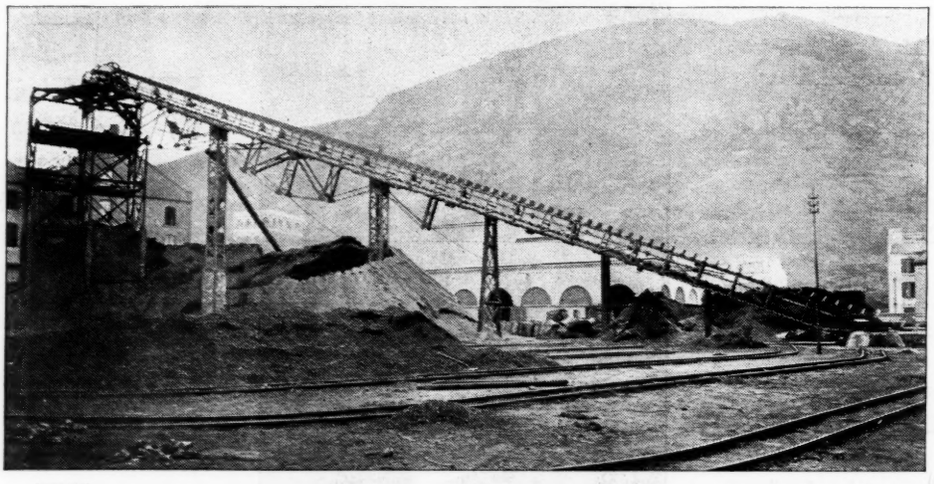

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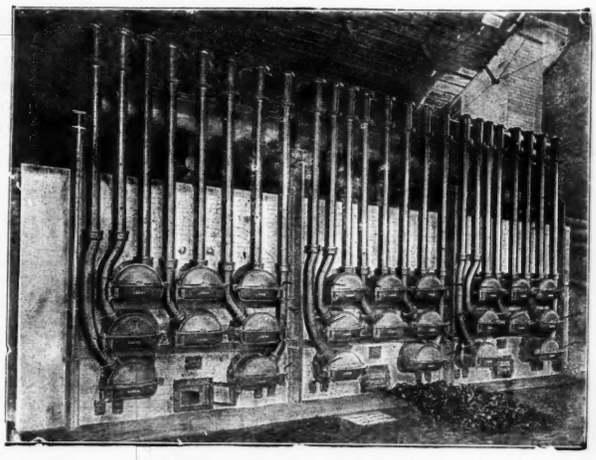

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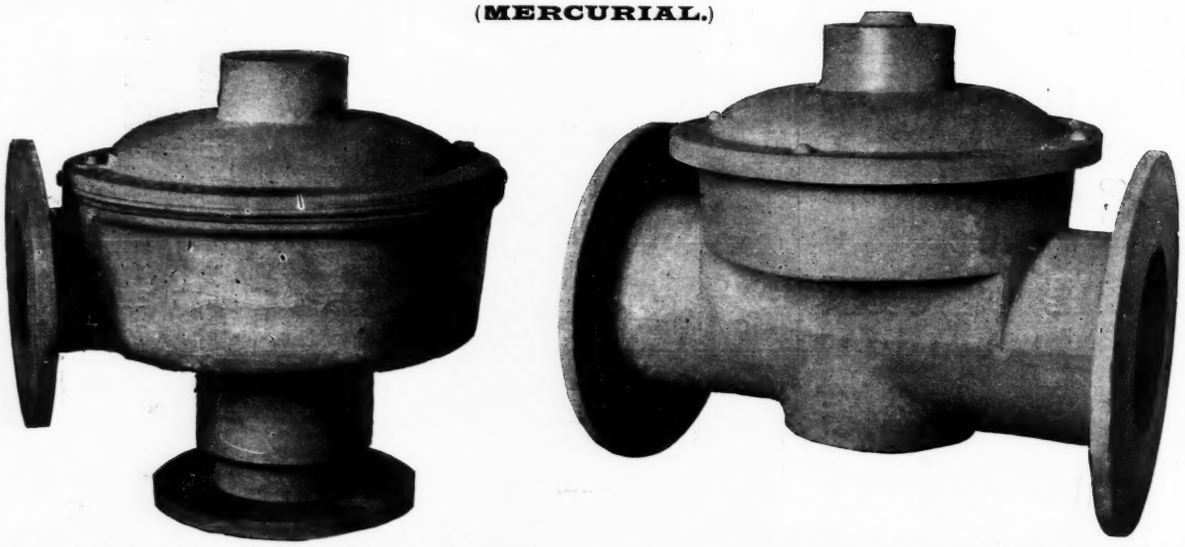

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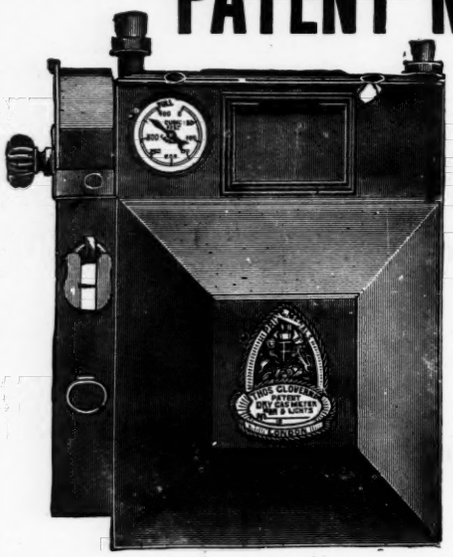

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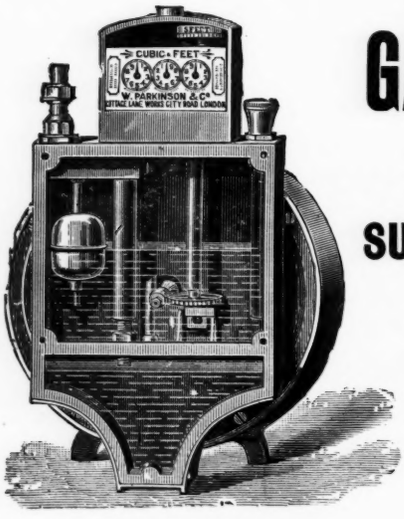

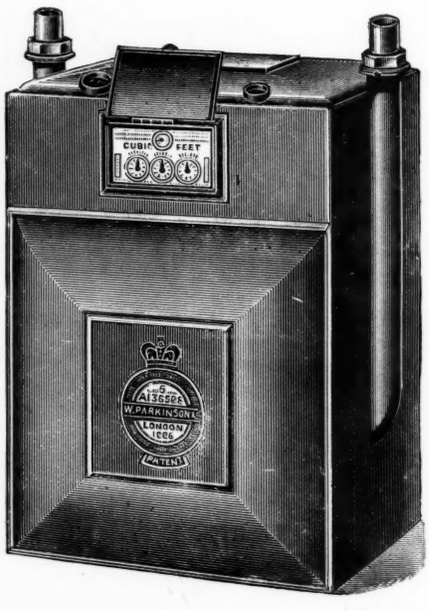

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EDITORIAL NOTES.

On Some Presidential Addresses, and Other Blessings of Civilization.

IT will be a blessed relief when the present Year of Grace has run its course, for at least one reason. There must then be an end to the composition of the Presidential Address which is devoted to a survey of the doings of the past century in the speaker's own particular line, topped off usually with a few predictions for the future. For two years, this great and terrible epidemic of retrospection and prophecy has raged throughout the world, which is unequally divided between those who deliver presidential addresses and those who, for various reasons, are compelled to listen to them or read them as reported. It broke out early last year, and has endured to the present time; Sir William Preece's Society of Arts address last week being a very typical case. Some Presidents have taken the complaint badly; while others have struggled manfully against it, and thereby deserved more than the usual formal vote of thanks for their effort. It is obviously easier to give way than to resist such an ailment. Presidential addresses normally have a tendency to run to reminiscence; but when the victim of his own virtues is elected to the chair of a learned or technical society at the close of one century or the beginning of another, the pressure of the circumstance is almost certain to overcome him; and he falls into retrospect almost as a matter of course. There is consolation in the knowledge that it cannot be so bad again in our time.

Some men are always retrospective or prophetic. It matters not to them what may be the date that brings them the opportunity for inflicting upon their fellows an address which can never be criticized. They will always march straight backwards into a past of which they know no more than others, or into an imagined future to which they perhaps are as unfit guides as could well be chosen. The "JOURNAL" has the privilege of being read by many worthy gentlemen who, in the ordinary course of events, are bound to preside over a technical society; and it has often uttered warnings against this besetting evil of addresses. We have repeatedly urged that the honour of the presidency of a society of one's fellows is above everything else a personal distinction. A man, for the time appointed, is made first among his equals; and his presidential address is the unique opportunity provided by custom for enabling him to justify his elevation. The President's individuality is unknown to the great majority of his colleagues when he is elected; and his address is to allow him to speak for himself.

Hence the personal "note"—the unveiling of that particular aspect of the man himself which he would like to be known by—should be predominant in a really good presidential address. Of course, if a President has a special right to speak of either the past or the future, by reason of his peculiar experience or his deliberately formed views, that is the shape in which his individuality receives its natural and proper expression. Unfortunately, it is usually otherwise. A president this year or last has felt constrained to cultivate the "century plant" to the best of his ability; and few have succeeded in making it flower to their honour and glory. Let us rejoice and be glad that the fashion of this laborious exercise must so soon pass away. After this riotous period of reminiscence and prophecy, any president of a self-respecting technical society who should perpetrate a similar performance, ought to be condemned to talk to the backs, instead of the faces, of his auditory.

Sir William Preece had a good deal to say that is true enough about the chief scientific achievements of the past century, but nothing that was novel. This, again, is one of the disadvantages of the retrospective presidential address. What is true in it cannot be new; and when it comes to prophecy, nobody can pretend to be sure of what a day will bring forth. Sir W. Preece said some true things about the application of electricity to public lighting being less effective than incandescent gas lighting. He also said some questionable things about the superiority of electricity to gas for the lighting of interiors. And he said something perilously like downright nonsense about the availability of electricity for warming beds, cooking food, and boiling water for family use. This part of the address reminds one of the historical doll's-house lighted by electricity which a certain Mr. W. H. Preece used to carry about for the delectation of suburban and provincial lecture audiences. Inasmuch as the realization of these forecasts was bound up in the provision of electricity for about a farthing per unit, there would not appear to be any great risk of the fulfilment treading too close upon the heels of the prophecy.

Curiously enough, Sir W. Preece mentioned the smoke nuisance as something that the science of the new century ought to be competent to deal with; and on the same afternoon the Coal Smoke Abatement Society held a meeting at the Duke of Westminster's town house, which was, of course, concerned with the same question. Perusal of the remarks made on both occasions is not encouraging of the hope that we are getting any "forrader" in the desired direction. All that Sir W. Preece could contribute towards a solution of the problem was a somewhat feeble joke about people being forced to consume their own smoke, and saved from consuming the smoke of others. Sir W. Broadbent, speaking at the other meeting, could only enunciate the safe platitude that "whatever tended to the purification of "the atmosphere of London would tend to preserve not "only the health but the happiness of the community." And yet it is hard to believe that Londoners are all valetudinarians, incapable either of working or playing. Principal Lodge said the only really practical things heard at the meeting. He reminded his hearers that those of them who said they did not like gas-fires, but used coal-fires, really make gas-fires, and make the gas very badly. He declared that gas should be used for cooking and heating; and he recommended gas companies to aim at producing cheap gas on a large scale. He had not the London County Council to deal with. Sir W. B. Richmond sang the praises of his Society, and took credit for the work hitherto done by it in stirring up the authorities to put into operation the powers entrusted to them by the Public Health Act, 1891. It is not by any means a poor record; but Sir W. B. Richmond wants the fines for smoky factory chimneys to be heavier and cumulative, so as to be really deterrent. But what a satire it is upon the vaunted progress in science of the century, that such a means for procuring the inoffensive combustion of coal should be necessary at all!

When the next presidents of scientific societies compose their addresses, it would be as well for them to dilate a little more upon the failures and shortcomings of science. We have all heard more than enough about its triumphs. The ordinary citizen, when he is half-stifled by a fog, and is painfully reminded that all the Faculty cannot cure a cold; when he gropes his way through streets which are supposed to be lighted by electric arc lamps that might as well be in the moon; when he takes three hours to travel a dozen miles by express train, and arrives home to find the house in darkness because the gas-service pipe is stopped up with naphthalene—then the ordinary citizen in these circumstances is not properly attuned to sing the praise of modern science.

The Notices of the Bills of the Commercial and South Metropolitan Gas Companies.

THE Parliamentary Notices of the two London Gas Bills that were promised for next session have duly appeared. The terms of the Commercial Gas Company's notice were given in last week's "JOURNAL." They indicate a statutory reorganization of the Company's affairs of first-rate importance, and of as sweeping a character as it is possible to include in a single Bill. The Company, we are assured, are well advised in thus throwing themselves entirely upon the justice of Parliament. Not for them, after 26 years, to trouble the Legislature with a niggling Bill for a little more money, or other incidental adjustment of means to ends. Whatever else the official opponents of the Company may allege against them, it can never be truly said that they have been afraid to come to Parliament frankly, and with nothing kept back. It will not be forgotten, when the right

time comes, that the Company voluntarily relinquished the privilege which they were the last gas company to receive, of issuing new stock to existing proprietors at par. The present proposal of the Company is, first, to place themselves in line with the other London Gas Companies, by converting and consolidating their capital upon a uniform basis approximating to the real value of the property. There will be no difficulty about this. With the completion of this stock operation will disappear an exception which has for some few years vitiated all statistics purporting to give a complete view of the financial position and working results of the three undertakings which divide the gas supply of the Metropolis among them.

The next point in the Company's notice relates to a subject of a similar, yet different, character. It is proposed to follow the example set by the South Metropolitan Gas Company in 1900, and seek powers for the reduction of the standard of illuminating power of the gas, and the corresponding alteration of the initial price under the sliding-scale. This is by way of giving effect to the recommendation of Sir James Rankin's Committee pertinent to this part of the London gas settlement—in the Company's case, dating from 1875. Of course, all the conservative officialdom of the London County Council will be in arms against such an attack upon their prerogative to annoy the Company in the name of penalty gas testing. The improvement, according to the light of modern science, and the cheapening of the service rendered to the public by a statutory company, are among the things which the London County Council will spend any amount of the ratepayers' money to prevent.

The remainder of the Commercial notice covers a programme of popularization which should not arouse any bitter opposition. The time for holding the ordinary meetings is to be changed; and facilities are asked for the issue of new stock to gas consumers and employees. The London County Council will not like this, because the Socialistic Trade Unionists who sway their policy are averse, for reasons of their own, from everything tending to make workpeople more satisfied with their employment. Of course, the opposition will fail; Parliament being not yet an institution for enforcing the decrees of the "Labour Bench" of the County Council. The Company's profit-sharing scheme is to be authorized—another grief for the Trade Unionists of the Council. Permission is to be asked to "manufacture" as well as deal in gas-fittings—a request which will again raise the question that was provisionally settled by Parliament on the advice of the late Sir Courtenay Boyle. It was originally a matter affecting the trading proclivities of local authorities, which threatened to carry some of these bodies very far into shopkeeping of a style and to an extent regarded by the Board of Trade as undesirable. The difficulty was, as usual, that of drawing the line fairly between what local authorities might dabble in for the convenience of their public, and unsuitable extensions of the practice; and Sir Courtenay Boyle suggested that a line might be drawn at the manufacture of such accessories. The suggestion was acted upon, and became a rule; but, as we pointed out at the time, it ought not to have been applied indiscriminately to trading companies as well as to local authorities. Regard for the dividend keeps company directors and their managers from going into unprofitable developments; while there is no such restraint on local authorities, who are in all probability already wasting the ratepayers' money at every point.

The South Metropolitan Company's application was not so formally announced in advance as that of the Commercial Company. Any surprise that might be felt at the reappearance of this Company as a suppliant for parliamentary powers of a different order from those which they have been so brilliantly successful in obtaining these two sessions past, will subside on perusal of the notice. The salient fact of the Company's position is that their output of gas is increasing so fast that their only works available for extension —East Greenwich—are getting filled up at such a rate that more elbow-room must be secured betimes. The very doubtful issue of the project for the acquisition of the Nine Elms manufacturing station, which would be handy for supplying the enormous growth of population in the vicinity of Clapham Junction, makes it incumbent upon the South Metropolitan Board to provide for the future, irrespective of the possibility of these works becoming available for the purpose. Their hands must not be tied in this matter. It appears to have commended itself to the Board that their better course will be to arrange for the enlargement of the East Greenwich site. In this line of action, they are doing precisely as the Corporation of Birmingham have found it expedient to do. It is folly to delay the purchase of gas lands until the accommodation is urgently wanted. The frugal South Metropolitan Company are not likely to burden themselves with an unprofitable land purchase that they cannot well afford. It is improbable that they will be able to satisfy their requirements on the moderate terms secured by Birmingham. It is not to be doubted, however, that all this has been thoroughly looked into.

There is a more "sporting" part of the coming Bill, which will flutter the dovecotes of the London Gas Referees and the London County Council Gas Examiners' Department in a degree which the occupiers of these official positions have not hitherto experienced. The revolution effected in the ruling principles of London Gas Supply by the South Metropolitan Act of 1900, brought all the established gas-testing arrangements within the shadow of obsolescence. With the discontinuance of the supply of 16-candle gas, as the 20-candle cannel gas once supplied by the Chartered Company had long been discontinued, the London Gas Referees must have begun to feel something like the European monarchs of 1848, as described by Heine, when everyone of them put his hand to his head on waking in the morning, to feel if it was still on his shoulders. The whole paraphernalia of Gas Refereedom, and County Council Gas Examinerdom in its train, goes out of fashion with the advent of low power gas; and the South Metropolitan Company now propose to abolish the antiquated system, substituting for it the provisions of the Gas-Works Clauses Act, 1871, which are understood to be good enough for the rest of the United Kingdom. The holders of office would be compensated for any loss of emolument they might suffer through this reforming process. It is a distinctly engaging proposal, which will give rise to an interesting discussion in Committee, whatever the result may be for the present. It is, at any rate, the commencement of a movement that is bound to gather force the more it is opposed; and if the Gas Referees and the County Council are wise, instead of meeting the proposed reform with a direct negative, and imputing all sorts of unworthy motives to the Company suggesting it, they will consider how to turn it to account by formulating a scheme of gas examination better suited than the one in force to the altered circumstances of the industry.

The London Subways Bills.

THE recent fulminations about the upheavals of the streets of London have had their first effect in the promotion of Subway Bills by the Corporation of the City of London and the London County Council. The Corporation already have considerable statutory powers for making pipe subways, and inducing gas and water companies to use them when made; but these powers do not directly touch the breaking up of streets, which is the popular grievance. It must be conceded that such general facilities for laying mains and cables in highways as are given to authorized persons by the Acts of 1847, do not fully meet the requirements of crowded cities. The Corporation of the City of London, at any rate, appear to think it high time that they had a great deal more control than they possess under any General or Local Act for regulating the breaking up of streets within their jurisdiction. Accordingly, it is the intention of the Corporation to apply to Parliament for sanction of various drastic provisions relating chiefly to new and additional street openings. Such works are only to be entered upon after two months' notice, and streets once reinstated are not to be again broken up until after an interval, except in case of emergency or for connecting services. The manner in which streets are to be opened, and the work carried on, is also to be subject to additional regulation.

The London County Council by their proposed Subways and Tramways Bill intend, after their manner, to do some very drastic things in this respect. The Bill is, in the first place, to authorize the construction of the proposed tramways-subway under the new street from Bloomsbury to the Strand. It then proceeds to vest in the Council "the "subsoil under streets," with the object of enabling the Council hereafter to make such subways as they may think fit. All owners of pipes and wires are to be compellable to transfer their property into such subways; paying for the privilege such charges as the Council may impose. All rights and privileges which might interfere with the objects of the Bill are to be varied or extinguished. This is a "short way" with the possible opponents of the Council

which may be commended for its fine breadth of scope and scorn of details. Many things will be said on the subject before this provision, or anything at all like it, becomes law. Meanwhile, has it occurred to anybody to estimate by how much the value of the shop property in the new West Central thoroughfare is likely to be depreciated by putting all the prospective through traffic underground? This is one of the considerations that the County Council may have taken account of before they rushed out their tramways-subway scheme for the thoroughfare; but, if so, an explanation on the point is due to those who approved of the original plans of the street on the assumption that it was to be as others, with full advantage of through as well as local traffic.

The Situation in South Wales and France.

At the time of writing last week upon the situation in the South Wales coalfields, the prospect, though very doubtful, appeared less immediately threatening than during the preceding fortnight; there being a very general expectation in Wales that the men would not proceed with their policy of "stop" days, and that matters would for some time rest as they were. That expectation was, however, to the surprise of everyone and the exasperation of many of the coalowners, falsified by the decision at which the men's leaders arrived on Monday of last week, to order another stoppage—to-morrow being the day named. This decision, and the consequent uncertainty as to how many more idle days are to follow, has thrown the Welsh coal market afresh into a state of nervousness, which is having a decidedly prejudicial effect upon business. The men's idea is declared to be to keep up the current price of coal until at least the annual contracts usually made at this time of the year have been concluded, in the hope that the prices agreed upon for future delivery will thereby be enhanced. As the actual result of the stop-day policy has been, first to call particular attention to such contracts at low prices as have been made, and then to cause those would-be customers who have not yet bought either to refuse to commit themselves to more than short-period contracts, or to go elsewhere for their requirements, it is a question of some interest as to what step the men will take next in pursuit of their unattainable object.

This extraordinary anxiety upon the part of the South Wales Federation to avert the fall in prices that the natural course of events has rendered inevitable, is, as our readers are aware, due to the desire to maintain wages at a high level until a scheme for the arrangement of wages to succeed the existing sliding-scale agreement shall have been agreed upon between the coalowners and the men. At their meeting yesterday week, the representatives of the men on the Sliding-Scale Committee drew up their proposals for such a scheme, and the proposals were communicated on Thursday last to the Coalowners' Secretary. They are understood to include the complete abolition of the sliding-scale system, and the appointment of a Conciliation Board with an independent Chairman—the Board to determine the rates of wages, subject to a provision that they shall not exceed 70 per cent., nor fall below 40 per cent., above the standard of 1879.

To deal with the last point first—the maximum and minimum fixed by the men—it may be said at once that there is not the remotest probability of the owners agreeing to such terms. The minimum rate proposed is 40 per cent. above standard. Taking the fourteen years, 1886 to 1899 inclusive, the wages paid have only exceeded that rate in two years—namely, 1890 and 1891—when wages rose beyond 50 per cent. above standard. In no other year did the rate payable under the scale exceed 30 per cent. above standard; while six times did it fall to 12½ per cent. or less. At the end of 1886, wages were 5 per cent. above standard; 1887, 2½ per cent.; 1888, 7½ per cent.; and 1896, 10 per cent.—an average for fourteen years of 21 per cent. above 1879 rates. And the men modestly ask for a minimum of 40 per cent.! They, it is true, offer to be content with a maximum of 70 per cent.—a figure never approached until the "boom" that is now rapidly becoming a memory; to which offer the answer "Thank you for nothing" is most likely to be returned.

The South Wales Federation are, it will be seen, proposing maximum and minimum rates higher than those at present in vogue in the districts included in the Miners' Federation of Great Britain, where the arrangement is that wages shall not exceed 60 per cent., nor fall below 30 per cent., above the standard of 1888—a standard which is not 10 per cent. above that of 1879. It may therefore be assumed that the South Wales miners, while asking a higher, are ready to accept the lower, range; but, from the figures given above, there is little likelihood of the owners agreeing to so high a minimum as 30 per cent. above the 1879 rates. What is more, unless they are very much misrepresented by journals well qualified to express an opinion upon the subject, the coalowners have no intention of agreeing to the substitution of a Conciliation Board for the sliding-scale. Their idea is rather a sliding-scale with a minimum—a proposal which, before the Miners' Federation of Great Britain appeared on the scene in South Wales, would undoubtedly have been accepted thankfully by the men under the advice of that now zealous pervert "Mabon," once a staunch and enthusiastic upholder of the scale. Now, however, all that is changed; Mr. Pickard's Federation rules the roost, and in the view of that body sliding-scales are anathema. With the owners, on the one hand, determined to uphold the sliding-scale, and the Federation, on the other, aggressively anxious to destroy it, a serious struggle in the Welsh coalfields appears to be a practical, if most unhappy, certainty in the not distant future.

When the struggle will begin it is not easy to predict. It is possible that when it becomes evident to the men that nothing they can do will avail to force up the price of coal for next year's delivery to current rates, they may determine to precipitate matters before falling prices have brought down wages. The result of the audit, which will be made known next Friday, will be awaited with much interest. Or a continuance of the stop-day policy may drive the coalowners to take extreme measures. The irritating interference of the National Federation in local disputes which formerly were easily settled (without any cessation of work) by the Sliding-Scale Committee, but which are now often made the occasion of serious and costly stoppages, has naturally incensed the owners of collieries in South Wales against the Federation; while recent events have served to embitter feeling still more. A declaration of war is, therefore, possible at any time. It may not come for some months; it may not come at all, though this, we fear, is an improbable alternative. To attempt to be more definite in our forecast would only be to assume a prescience we cannot, in the nature of things, possess. We have endeavoured to present the essential factors of the situation, upon which everyone can found his own opinion.

In France, trouble has broken out sporadically among the coal miners, and much anxiety is felt on account of the possibility of a general strike "making itself," with political complications to follow. The French miners are, however, by no means well organized, nor do they possess substantial funds. Lengthened disturbances are, therefore, not to be feared. Meantime, trade generally on the Continent shows no sign of improvement.

WATER AFFAIRS.

The London Water-Works Purchase Question.

The President of the Local Government Board has taken the first step in the direction of redeeming the promises he has made on several occasions—the most recent being at the dinner given to him at the Hôtel Métropole on Monday evening of last week—to introduce into Parliament next session a measure dealing with the London Water Question. Probably while Mr. Long was speaking, the notice for his Bill was being put in type; for it duly appeared the following morning in "The Times." As was to be expected, the Government scheme for disposing of this troublesome question follows the recommendations in the report of the last Royal Commission. It is proposed to create a Water Board, and to provide for the representation thereon of certain County, Borough, and Urban District Councils, the Corporation of London, and the Conservators of the Thames and Lea, together with such other bodies as may be named in the Bill. The Board are to have power to acquire the properties of the eight Water Companies and the Staines Reservoirs Joint Committee, and supply water in the areas over which these bodies have any rights, and also in the parishes of Sunbury, Chessington, and Cuddington. No details are given as to the exact constitution of the Board—that is to say, the total number of its members, or the extent to which the several constituent authorities will be represented. But it may be presumed that in this respect, too, the recommendations of Lord Llandaff's Commission will be adopted. The consideration to be paid to

the Companies for their undertakings is to be settled by agreement or determined by arbitration; and, in fixing the amount in the latter case, no allowance is to be made "in "respect of any compulsory sale, or any enhancement or "depreciation of the market value of any shares or stock," or other securities of the Companies, due to "the passing "or anticipation of the passing of the intended Act." The Board will, of course, be endowed with all the necessary financial and other powers for carrying out the work entrusted to them. These need not be detailed here.

Following the notice for the Government Bill came that for the measure which, in accordance with their recent decision, the London County Council intend to introduce in opposition to it. In certain of its details, it does not differ very materially from that of Mr. Long; but fundamentally it is its antithesis. It constitutes the Council the controlling authority as far as the water supply of London is concerned, and invests it with all the necessary powers to purchase and manage the Companies' undertakings. These are to be acquired by agreement or arbitration; and, in the event of the latter method of fixing their value being resorted to—as in all probability it would be, for buyers and sellers are not likely to be of one mind in the matter—the arbitrator is to award such a sum as will represent "the fair and reasonable "value" of each undertaking, "without any addition thereto "in respect of compulsory sale." The Council undertake to provide for the reinvestment, without cost to the proprietors of the stock or shares, of moneys which, under the intended Act, may become payable to them, or make some allowance in respect thereof. In this case, as in the other, provision will be made for entrance into possession of the undertakings "before the ascertainment of the consideration money;" and the Council will ask to be authorized to sell to county or local authorities having districts outside the County of London such portion of the works purchased from the Companies as may be specified in the intended Act. Without going into further detail, it may be said that the Bill will be that of last session resuscitated. But, unless we are greatly mistaken, its promotion will be regarded as a piece of impertinence, in face of the action of the Government; and we venture to predict for it a similar fate to that which befell its predecessor.

The preliminary steps having been taken by the publication of the notices, it may be presumed that the two Bills will in due course come before Parliament. If Sir Blundell Maple reintroduces his late Bill of last session, there will be three schemes before the Legislature for settling the London Water Question; and assuming that the inhabitants of the Metropolis are as eager to have the undertakings of the Water Companies transferred to a public body as some of their representatives make out—though, it must be confessed, there is very little indication of it—they will not allow the session to pass without a settlement. They will have three forms of controlling authority to select from, on two of which they will be indirectly and on the third directly represented; and indications are not wanting that it will be difference of opinion on the question of indirect *versus* direct representation that will constitute the obstacle to the progress of the Government measure. Mr. W. H. Dickinson, the former Chairman of the Water Committee of the London County Council, is reported to regard the proposed Water Board as "a large Water Company without "responsibility, and lacking even the enterprise caused "by the necessity of earning a dividend." Assuming that Sir Blundell Maple does not intend to proceed with his Bill, the placing of either of the others upon the Statute-book will involve the ratepayers of London in a financial transaction of which they do not appear to appreciate the magnitude. For before any steps can be taken in the way of improving the water supply, the undertakings of the Companies now furnishing it must be acquired on fair arbitration terms. To talk about introducing competition is idle. No Parliament would ever sanction such a thing. To depreciate the value of the Companies' property, as has been persistently done by the Radicals of the County Council, is equally idle; for even if the arbitration is not of the "dis-"tinguished" kind alluded to by Mr. Long on the occasion to which reference has been made, it must, at least, be fair, open, and competent. The Companies must not, as he was careful to point out, be treated as "sinners;" nor must there be anything approaching "confiscation of interests properly "held and properly exercised for the benefit of the people as "a whole." If the ratepayers of London are so dissatisfied with the present supply of water that they will not object to paying £50,000,000 to have it placed in other hands, well and good; but if they suppose that by so doing they will get it any cheaper, except, as Mr. Boulnois put it at the meeting of the West Middlesex Water Company on Tuesday, at the expense of the rates, we believe they will be egregiously mistaken. Moreover, if they expect to find a public body more controllable than the Companies it will supersede, we are afraid they will be doomed to disappointment. However, they will have plenty of opportunities of considering this question from all sides when the Bills are introduced.

Water Supply for "Domestic" Purposes.

In the "Journal" for the 13th of August last we made a few comments upon two cases which had just come before the Courts on disputes which had arisen over the interpretation of the term "domestic" as applied to a supply of water. In one case, a boarding-house keeper at Yarmouth failed in his contention before the local Magistrates that he was entitled to a supply at the domestic rate; the Water Company's claim to be paid on their "business" scale, as in the case of other establishments of the kind in the town, being upheld. The Magistrates decided, therefore, that the supply in question was for business purposes; but they expressed their willingness to state a case for the opinion of a Superior Court. The other matter noticed on the occasion alluded to was a dispute between the Urban District Council of Barnard Castle and the Governors of the North-Eastern Counties School, as to the charge for water supplied by the Council to a swimming-bath. The Council claimed to be paid on the "business" rate, which the Governors contested on the ground that the supply was for "domestic" purposes. Mr. Justice Buckley decided against the Council, with costs. The case stated by the Yarmouth Magistrates came before the Lord Chief Justice and Justices Darling and Channell, in the King's Bench Division, last Thursday; and, as will be seen by the report which appears elsewhere, it resulted in a reversal of their decision. In view of the importance of the matter, the judgments are given in full. We are sure they will be attentively read, and therefore all that it is necessary to record here is the fact that they upheld the principle that the proper criterion for settling the charge for water should be the use to which it is put, and not the premises whereon it is used.

The Lord Chief Justice was careful to point this out; and he made it clear that his decision was not to be understood as going further than this—that if the facts in a particular case show that there is no user of water except for domestic purposes, and by persons who are inmates of the house in the ordinary sense, the supply is a domestic one. The other learned Judges concurred, though Mr. Justice Darling confessed that he had arrived at his conclusion only after much hesitation and difficulty; but Mr. Justice Channell did not appear to have any doubt on the matter. He said that, to constitute a "domestic supply," it did not seem to him to make any difference whether the inmates of the house served were guests, paying lodgers, pupils whose parents paid for them, or paupers for whom the parish paid; and he added that he thought their decision was, to a certain extent, governed by authority. His Lordship no doubt referred to the Liskeard Union case, which was one of those cited in the course of the arguments. We quoted that case when commenting upon the proceedings before the Magistrates, for we confess to being at the time unable to reconcile their decision with the dictum of the learned Judge who tried it. Lord Coleridge, it may be remembered, held that "where "a number of persons of different families are collected from "different places, but under one head and one roof," they are, "for all practical purposes, one family." The occupants of a boarding-house, it seemed to us, answered this description to the letter; and therefore we were glad to find that a case was to be stated. Though the decision of the Superior Court has justified our view of the matter, we cannot but regret that the initial proceedings had to be taken in a Court which prevented their Lordships from allowing an appeal from their decision. Unanimous as it was, it would have been accepted with much more satisfaction as a precedent if it had been reviewed and confirmed by a higher tribunal. On the point of procedure, it is a matter for consideration whether the classing of such an action as this among "criminal" cases, does not call for an amendment of the law. In connection with the disputes above referred to, it may be interesting to call attention to one reported in the last number of the "Journal" (p. 1323), in which the Wilmslow Magistrates included the use of water for amateur

photography among "domestic purposes," and refused to allow a claim made by the Stockport Corporation for payment of an extra charge in respect thereof.

River Pollution and Purification.

Of the three papers which came before the delegates for discussion at the opening of the proceedings on the second day of the recent Sanitary Institute Conference, that by Professor Henry Robinson, dealing with "Water Supply and "River Pollution," is the one which, owing to the position occupied by the author, and the close study he has given to these questions, calls for special notice. River pollution has, unfortunately, always existed; and all our legislation hitherto has been powerless to entirely prevent it. How is it to be obviated? The answer that most readily comes to the lips is: By excluding every source of pollution. This, however, is much more easily said than done. Professor Robinson, as will be seen by the abstract of his paper which appears elsewhere, dealt mainly with pollution by manufacturers' refuse; and the conclusion he has arrived at is that in this respect there should be a certain amount of elasticity in enforcing rules and standards of purity, and that every case should be carefully considered on its merits, in order to avoid applying a rigid standard under totally different circumstances. The claim seems to us to be reasonable; and this was the view generally taken by the delegates who spoke upon the point. It was not suggested that an independent inquiry should be held in every case, but that some kind of sliding-scale might be introduced. With regard to pollution of rivers by sewage effluents, Professor Robinson considers that the utilization of bacteria in anaërobic or aërobic chambers is the solution of many of the existing difficulties, inasmuch as it allows of the resultant effluent being used on land for agricultural purposes with greater advantage than when the sewage is applied in its crude state. But here comes in the requirement of the Local Government Board that, under all circumstances, a definite area of land in respect to population should be obtained for the final treatment of the effluents; and it has been found that the enforcement of the rule often involves the anomaly of good porous land being placed in the same category as stiff clay land. This is a matter to which attention has been called in the interim report of the Royal Commission on Sewage; and the more it is considered the more obvious it becomes that in this respect also some relaxation of the rule is necessary. The application of sewage to land has to be governed by sanitary, agricultural, and economic considerations; but Professor Robinson pointed out that these are not always kept clearly in mind, and he agrees with the Commissioners in the opinion that each case must be judged upon its merits. He laid particular stress upon the fact that an effluent which is not chemically or bacterially perfect, might, under certain conditions, be admitted to a stream of much greater volume, in which it would be exposed to oxygenation, the self-purifying action of plants, &c., by which, in a "short run," it would be completely purified. The result of modern investigations has been to prove that the axiom that no river is long enough to purify itself, does not now hold good. The three papers and the discussions thereon contain many points of interest, not the least important being the support given to the suggestion of the Sewage Commission that matters such as those dealt with might be handed over to a separate Commission, or to a new Department of the Local Government Board. The creation of such a Department of the State seems, for many reasons, to be urgently needed.

Patent Office Library Handbooks.—Another of the useful little guides to the Patent Office Library which are now being issued by the Comptroller-General (Mr. C. N. Dalton), and to which attention has already been called in our columns, has just been published. It is a subject list of works on certain chemical industries which may be found in the Library; and it reveals the fact that a large number of books relating to destructive distillation, gas burners and lamps, gas-fitting, lighting, cooking, and heating by gas, and gas manufacture and distribution, in various languages, are available for consultation. In addition to the works dealing with the technical side of the gas industry, there are others recording its history and treating the subject generally; while its progress week by week and year by year is chronicled in the files of the technical papers and the volumes of Transactions of the several Associations. Books on acetylene, incandescent lighting by gas or oil, and tar and its distillation, are comprised in the 1003 works, representing some 1990 volumes, contained in this list, which is to be purchased from any Government Stationer, for 6d.

ESSAYS AND REVIEWS.

LOCAL ADMINISTRATION AND TAXATION.

No one who has had experience of parochial or administrative work can have failed to become cognizant of the important part taken by the Local Government Board in the supervision of what may be called the internal and domestic affairs of the nation. The knowledge thus acquired is, however, necessarily limited. In order to fully realize the exact nature and the extent of the work of the Department, one has to glance over, if not to peruse, the bulky reports which are annually presented to Parliament by its President. The thirtieth of the series, for the year 1900, has lately been issued, and one section—that relating to the Water Supply of the Metropolis last year—noticed in our columns. It is intended now to extract a few particulars from the portion dealing with local administration and taxation. But before this is done, it may be well to record that the report proper, which bears the signature of the Right Hon. Walter H. Long, extends to 216 pages, compared with 206 pages for the preceding year; and it is accompanied by sixteen appendices, occupying 722 pages. The various subjects dealt with are arranged in five groups: The work of County Councils under the Local Government Act, 1888; proceedings under the Local Government Act, 1894; the relief of the poor; the public health and local administration; and local taxation and valuation.

Taking financial matters first, we find that the Board sanctioned the raising of £10,829,747 last year by urban and rural authorities —the former requiring £468,569 for water supply and £1,536,180 for sewerage and sewage disposal, and the latter £140,071 and £387,272 respectively; while joint boards asked for £130,155 for carrying out works coming under the second head. In addition to these sums, £10,774,412 was sanctioned by Parliament to town councils and sanitary authorities under Local Acts. Since the constitution of the Board in 1871, they have given permission for the raising altogether of £112,991,064; and during that period £108,084,081 has been granted by Parliament. Attention is called to the great increase which has been noticed during the past few years in the amounts required for electric lighting purposes. Last year the Board sanctioned loans exceeding in the aggregate those for 1899 by £633,457, and those for 1898 by nearly £2,000,000. The amount was, in fact, greater than the total of all the loans authorized for electric lighting in the nine years preceding 1897. From 1888 to the end of last year, loans to the amount of £10,278,827 had been granted. Under section 243 of the Public Health Act, 1875, the Board recommended the Public Works Loan Commissioners to make advances during the past year to the extent of £178,025 to local authorities. Of this sum, £144,894 was required by town and urban district councils, £24,809 by rural district councils, and £8322 by joint boards.

Among the Provisional Orders issued by the Board in the period covered by the report, 63 were under the Public Health Act, 1875, and two under the Gas and Water Works Facilities Acts, 1870 and 1873. In the first-named group were Orders altering the Burslem Local Board Gas Act, 1877, the Chesterfield Gas and Water Board Act, 1895, and the Kendal Corporation Gas and Water Act, 1894. One of the Orders in the second group was for Ilkeston and the other for Rothwell. Further powers were conferred on local authorities in regard to their gas and water undertakings; including the acquisition and use of additional lands for the manufacture and storage of gas, the supply of gas and of apparatus, &c., used in its consumption, the inspection of gas-fittings in new buildings, the supply of water in bulk beyond the limits of a local authority, the provision of cisterns, &c. The following amounts were sanctioned in respect of the gas in the towns named: Burslem, £50,000; Chesterfield, £50,000; Fenton, £15,000; Leigh, £50,000; Milford Haven, £1000; Newton-in-Makerfield, £20,000; and Stafford, £20,000. The Wigan Corporation were granted "such sums as may be necessary" for their gas undertaking. For purposes of water supply, the Barmouth Urban Council were allowed to raise £10,000, and the Milford Haven Urban Council £6000. The 65 Orders above referred to were included in Confirmation Bills, which passed through Parliament with but slight opposition.

As most of our readers are aware, the Local Government Board possess important powers in regard to water supply. Under section 62 of the Public Health Act, 1875, any district council may apply to them to determine the reasonable cost at which water may be required to be furnished to houses which are without a proper supply; and the Board are empowered by section 8 of the Public Health (Water) Act, 1878, to fix a general scale of charges for the whole or any part of the district in question. Eight such scales were fixed last year in respect of Ashby-de-la-Zouch, Chapel-en-le-Frith, Clitheroe, Hunsworth, Malpas, Nantwich, Rainford, and Tarvin, or contributory places. Under section 11 of the Act of 1878, the Board may invest any town or urban district council with all or any of the powers and duties conferred and imposed upon a rural district council. During last year they issued Orders investing the Brightlingsea Urban District Council with the powers and duties of a rural authority under sections 6, 7, and 9 of the Act, the Burton-on-Trent Town Council with those specified in section 7, and the Wenlock Urban District Council with those contained in section 9. The

first-named section places restrictions upon the occupation of houses newly erected or rebuilt without a certificate being obtained from the district council of the sufficiency of the water supply; the second provides for the periodical inspection of the water supply of premises; and the third authorizes the recovery of rates or rents for water supplied by stand-pipes.

In addition to the local inquiries conducted by the Engineering Inspectors of the Board under the provisions of the Local Government Acts of 1888 and 1894 and the Municipal Corporations Act, 1882, others were directed in 1094 cases. The majority of them had reference to applications for sanction to the raising of money for carrying out works of a permanent character under the provisions of the Public Health, Electric Lighting, and other Acts. There were 61 inquiries relative to petitions for the issue of Provisional Orders under the Public Health Act, 1875, the Gas and Water Works Facilities Act, 1870, and the Housing of the Working Classes Act, 1890; 22 of them being in regard to objections raised to the construction by local authorities of works of water supply or sewerage beyond their districts. Some of the other inquiries had reference to complaints, under section 299 of the Public Health Act, 1875, of default by district councils in the matter of sewerage or water supply; to applications for consent to take proceedings against manufacturers for the pollution of rivers, or for connecting the sewers of adjoining districts; and to proposals for the supply of water by one local authority to another. The approval of the Board, so far as matters within their jurisdiction were concerned, was duly given, under section 4 of the Borough Funds Act, 1872, to the resolutions of 74 public bodies to promote 66 Local Bills in Parliament, and of a like number to oppose 51 similar Bills. During the year, the Board made reports to Parliament on 140 Private Bills, of which 72 were promoted by local authorities, and 68 by companies or other bodies. In 17 cases it was found necessary to make supplementary reports, owing to alterations being made in the Bills during their passage through Parliament. In an appendix to the report is given a list of the Acts obtained last year by local authorities and by gas and water companies in England and Wales, exclusive of the Metropolis.

The accounts of 810 urban district councils and their officers were investigated by the District Auditors last year, as were also those of 668 rural district councils, 89 joints boards, and 262 joint committees appointed wholly or in part by district councils. There were four disallowances and surcharges in the cases of two of the three town councils whose accounts were submitted to investigation; 482 in the accounts of urban district councils and their officers; four in those of gas and water boards; and 242 in those of rural district councils and their officers. Out of the total number of appeals made against allowances, disallowances, and surcharges by the District Auditors, the Board decided 248 in connection with urban district councils, two relating to expenditure charged in the accounts of a town council, and 86 in the accounts of rural district councils and their officers. Particulars of these appeals, and the Board's decision thereon, are tabulated in an appendix.

The fifth and concluding section of the report is that dealing with local taxation and valuation. In the past year the Board prepared and presented to Parliament returns showing for the year 1898-9 the receipts, expenditure, and outstanding loans of the various local authorities of England and Wales. They included summaries of the accounts of about 29,500 of these bodies, compared with 30,132 for the preceding year. A summary of the statistics is given in one of the appendices. It shows that the aggregate receipts, excluding loans, amounted to £72,178; including loans (£19,698,918), to £91,877,337. The total comprised £5,407,329 from gas-rentals, £3,480,035 from water-rates, and £599,621 from the supply of electricity. The expenditure, so far as it was not defrayed out of loans, came to £71,191,858; adding the payment out of loans, however (£21,504,728), made a total of £92,696,586.

Out of the £19,698,918 above referred to, £926,462 came from gas-works, £1,630,722 from electric light undertakings, £2,517,838 from water-works, and £2,055,159 from sewerage and sewage-disposal works. The outstanding loans of the local authorities in England and Wales at the close of last year amounted to £276,229,048, of which £19,247,026 was in respect of gas-works, £5,251,504 of electric light undertakings, £49,795,662 of water-works, and £28,546,920 of sewerage and sewage-disposal works. The relative proportion which the total of the outstanding loans bore to the National Debt at the close of 1874-5 and 1898-9 respectively is shown by the following figures: 1874-5: Debt, £768,945,757; outstanding loans, £92,820,100, or 12·07 per cent. 1898-9: Debt (comprising the funded and unfunded debts, and the estimated capital value of terminable annuities, but excluding £7,478,380 in respect of other capital liabilities), £627,562,585; outstanding loans, £276,229,048, or 44·02 per cent., against 41·3 per cent. in the preceding year. According to these figures, the decrease of upwards of £141,000,000 which took place between 1874-5 and 1898-9 in the amount of the National Debt, was accompanied by an increase of upwards of £183,000,000 in the total outstanding loans of local authorities, including loans for reproductive undertakings. Compared with the population of England and Wales, according to the preliminary report on the last census—viz., 32,525,510—the loans work out to £8 9s. 10d. per head; and taking the rateable value at Lady-day at £172,065,842, they are equivalent to £1 12s. 1d. in the pound. Compared with the year 1874-5, the outstanding loans had increased last year by £183,408,948, or 197·6 per cent.; and the amount of debt per pound of rateable value from about 16s. to £1 12s. 1d. Some of the loans, such as those for harbours, docks, and piers, are not charged upon the rates; while others, such as those incurred for gas and water works and markets, are primarily charged, in many cases, upon the revenues of the undertakings for the purposes of which they have been raised, and constitute a charge on the rates only in the event of the revenues proving insufficient to meet the payments of principal and interest on the loans.

An interesting table shows how the amounts received from the public rates by the various classes of local authorities have risen since 1873-4. In that year the total was £18,906,137; in 1898-9, it was £38,602,673 *plus* £1,332,091 received from grants under the Agricultural Rates Act, or together £39,934,764—an increase of £21,028,627. It is explained that much of this is no doubt "attributable to the needs of an increased population," and has, to a certain extent, been accompanied by a rise in rateable value. At the same time it is shown by another table that, taking the period between 1873-4 and 1898-9 as a whole, the percentage increase in the rates was much greater than that in population or rateable value, though large augmentations were made in the amounts of the grants from the Imperial taxation in aid of local rates. The increase in the amount of rates raised to meet the expenditure incurred in carrying out the provisions of the Elementary Education Act, 1870, is particularly noticeable. In 1873-4, the amount raised was £251,906; in 1898-9, it was £4,782,903, *plus* £107,199 granted under the Agricultural Rates Act, 1896, or together £4,890,102. This is a pretty substantial increase in the amount spent by the nation on the teaching of its children. Has it received a commensurate return in the greater knowledge and the higher general intelligence—the education, in the literal meaning of the word—possessed by those who have had the advantage of it? We will leave our readers to answer the question, and here will also leave the report.

AIMS OF THE LABOUR PARTY.

THERE has been, and frequently is, a good deal of talk about increasing largely the number of Labour Members in the House of Commons; and, only recently, the Miners' Federation of Great Britain has endorsed the proposal that a considerable fund should be raised, by special subscriptions from the members of that organization, to provide for the cost of prosecuting the candidature of a considerable number of labour representatives, and of maintaining such of the number as might be elected. We do not for the moment intend to enter into a discussion of the probabilities of those candidates finding constituencies to elect them; though we may remark that it is by no means a foregone conclusion that a labour candidate will find ready acceptance in a working-class constituency—the "sons of toil" being by no means over-partial to the idea of affording one of themselves an opportunity of (as they would say) "coming the toff" over them. What it is at present proposed to consider, is the probable policy that would be pursued by the Labour Party in the House of Commons were it to become a factor to be reckoned with. That is a matter of great importance, not only to employers of labour, but to all concerned in the welfare of industrial undertakings.

There is no need, as it happens, to speculate upon the programme which the Labour Party, as at present constituted in Parliament, would endeavour to carry out if they were in a position to enforce their demands—and it is to be observed that a party thirty strong might, under certain circumstances, be in a position to influence the trend of legislation very materially—because Mr. Keir Hardie has very kindly defined the policy favoured by gentlemen of his persuasion, in the November number of the "New Liberal Review," in answer to questions put to him by that journal. Mr. Keir Hardie first explains the working of the Labour Representation Committee, which has existed for about two years and comprises representatives from Trade Unions, Trade Councils, the Independent Labour Party, and the Fabian Society. Any candidate brought forward and financed by one of these sections receives the support of all, and is under obligation, if elected, to become a member of a Labour Group in the House, having its own organization and deciding upon its own policy. "Mr. Richard Bell, M.P., and myself are members of the Committee. Some 450,000 Trade Unionists [about one-fourth of the total] are already affiliated; and the number keeps increasing month by month. The Miners' Federation has not yet connected itself with the Labour Representation Committee."

Then we are told what are the "essential reforms" upon which Mr. Keir Hardie and friends wish to concentrate opinion. It is a truly modest list; and Mr. Keir Hardie explains that it is but an instalment. It is not put forward "as an exhaustive list, but merely as indicating some of the questions which we deem ripe for settlement and urgently pressing." This first instalment includes: "State or municipal organization of work for the unemployed; a legal eight-hour working day; pensions and maintenance for the aged and the infirm or disabled, and for widows and children;" and "a Municipal Enabling Act." This item, it is explained, would be an enactment "by which municipalities might, without further recourse to Parliament, undertake any form of industry in which private companies may engage, including the building of houses, the owning and farming of land,

the opening of workshops, banking, insurance, and the ownership of the liquor traffic, tramways, &c."

After mentioning "any form of industry in which private companies may engage," it might have been thought that the "&c." was unnecessary; but Mr. Keir Hardie evidently wished there to be no doubt as to the comprehensiveness of his proposal. As a sort of make-weight he throws in, to "take rank among the urgent questions," a couple of inconsiderable trifles: "State ownership of railways, and a graduated tax upon all forms of unearned income—rent or interest"—including, we presume, the "unearned income" by way of rent or interest accruing each year to the Trade Unions, amounting in 1900 to £80,800. This would, of course, be taxed at ten—or is it twenty?—shillings in the pound. What a trial it must be to the Trade Unions to be the possessors of some millions of that "damned thing" Capital!

Mr. Keir Hardie explains that he, and those who would, an they could, join him in Parliament, "appeal for support to all who are opposed to the present wasteful system of wealth production, with its pitiful makeshifts, its poverty, its drunkenness, its bloodshed and general squalor, and who desire the substitution for all this of a well-ordered, peaceful, industrial system such as Socialism offers." It is always well to realize exactly where one stands, and now we know that those who do not embrace with eagerness the "Municipal Enabling Act"—the passing of which will mean the solution of all economic problems—are supporters of poverty, drunkenness, bloodshed, &c. Unless, of course, Mr. Keir Hardie should happen to be hopelessly ignorant of the solid facts of life—an impossible thought!

We have referred to this article in order to remind those who have the welfare of the nation at heart of what the Labour gentry are really aiming at—not merely the due representation of the working classes in Parliament, but the subordination of all other interests to the supposed interests of that one section of the community. Mr. Keir Hardie, be it said, is absolutely frank about the matter. He says: "Those, therefore, who fear the Socialist deluge, should do their best to keep us from getting a footing in St. Stephen's, as, once that has been secured, good-bye to Liberalism and Toryism. Thereafter there can be but two parties—Labour and Anti-Labour."

Following this article of Mr. Keir Hardie's, is one entitled "Liberalism and Labour," which, were one to accept the writer's predictions as those of a prophet, would induce a mood of unmitigated pessimism. We are told that "the Liberal Party tends less and less to represent the capitalist and commercial interests, and has no future as one of two great parties in the State, except as a Democratic and Labour Party. . . . The conclusion of the whole matter is that the future of Liberalism and Labour must be, and ought to be, bound up together. United, they may present a successful resistance to the rapidly consolidating forces of privileges and monopoly, and carry on the good work of social emancipation; divided, they will inevitably be doomed to a long sojourn in the wilderness." We are not going to be led into discussing questions of party politics, but feel obliged to say that if, as we do not believe possible, the Liberal Party were to allow itself to be practically identified with the Labour Party, and the main division of political parties were to become one between Labour and Capital, the result would be immeasurable disaster to all classes of the community. Mr. Keir Hardie's article should go far towards rendering such a calamity impossible. Englishmen have not the makings of Socialists in them.

ELECTRIC LIGHTING MEMORANDA.

The Autumnal Presidential Addresses—Sir W. Preece on Electricity Supply—A Misleading Statement—Hitch in Electricity-in-Bulk Generation.

THE autumn season of Presidential Addresses has been opened this year with average brilliancy. The President of the Institution of Civil Engineers, Mr. Charles Hawksley, is not a specialist in electricity, and therefore he could not be expected to add anything material to the sum of human knowledge in this regard. The Chairman of the Council of the Society of Arts this year is Sir W. Preece, who is before anything else an electrician; and it is therefore only natural that one should turn to his inaugural address, delivered at last Wednesday's meeting, for enlightenment upon the electric problems of the hour. Those who have knowledge of Sir William Preece's oratorical style will not need to be told that on this occasion he was discursive. He always is; and he is never to be hurried in the unfolding of his matter. It took him some time to get through—to "run over" would be far too flippant an expression—the historical part of his address; but when he did come to the subject of electric lighting, he spoke with candour of the state of the trade rivalry between electricity and gas for street lighting which will not comfort thick-and-thin partisans of the former. He does not forget his Maidstone report. Consequently, he told the listening world the reason why the use of electric arc lamps for street illumination in this country is not to be compared with the practice in the United States. The difference is due to the "universal presence of cheap gas here, and of dear gas, or no gas, there."

This was quite correct and satisfactory; but, of course, Sir William could not "give the whole show away" in the same fashion. He said truly that, "As a matter of fact, gas used with the Auer mantle could compete satisfactorily with electricity in this direction," which is as handsome as an electrician can afford to be. It was necessary for him to save something for electricity; and accordingly he went on to claim that it is in domestic life that the electric light has made such strides in the United Kingdom. He comforted his electrical companions by stating that lamps are being improved every day, and made cheaper to work; while "cheapness of supply is also developing by the increased use of electricity for traction, motive, and heating purposes." It is news to hear that the domestic electric lamp is being improved or cheapened in any material respect or degree. As regards the cost of current, there have undoubtedly been changes. Sir W. Preece said that in Bradford "the current is only 1·22d. per Board of Trade unit, equivalent to gas at 7·32d. per 1000 cubic feet, and it is possible to contemplate the generation of electric energy at ¼d. per unit." It is important to mark here that Sir William is speaking of "generation," not of supply. We have checked his reference to Bradford by the "Electrician's" analysis of the last published accounts, which are for the year ending Dec. 31 last. We find that the figure for "total costs" is 1·251d., and for "works costs" 0·968d. per unit. The revenue was 2·561d. per unit sold—exceptionally low; but private consumers pay more.

Still, 2·561d. is not 1·22d.; and, as a matter of fact—as Sir William Preece is fond of saying—the consumer of Bradford electricity for domestic lighting purposes is charged 4½d. per unit, less 2½ per cent. for prompt payment and with a really gratis supply of incandescent lamps. This being the true state of the case, so far as the charge to the consumer is in question, where does Sir W. Preece's 1·22d. per unit come in? What has that computed figure to do with the consumer? It is simply irrelevant, as anybody can see. We do not know how Sir W. Preece makes his 1·22d. per unit of electricity equivalent to gas at 7·32d. per 1000 cubic feet. The parade of extreme accuracy, by giving the second place of decimals, is a bit of pedantry that will deceive nobody. Even so it does not matter, because this figure can only apply to the cost of gas in the holder. It has nothing to do with the price charged to the consumer. Inasmuch, however, as the difference between the two sums is a matter of simple multiplication by six, and it being the solid fact that the charge to private consumers of Bradford electricity is 4½d. per unit, as aforesaid, the equivalent charge for gas would, according to Sir W. Preece, be $4\frac{1}{2} \times 6 = 2s.$ 3d. per 1000 cubic feet, which does not show up the gas in an unfavourable light.

Sir William Preece went on to talk of "contemplating" the generation of electricity at ¼d. per unit. There is no harm in looking at the figure. A cat may look at a king. But as to realizing it, merely as a feat in generating current—that is a different thing. Sir William truly claimed that electricity can be generated by burning fuel at the pits' mouth for less than any water-power plant could do the work; but he was fain to confess that hitherto the business of doing this for ordinary industrial purposes has hung fire. He only knows of one such scheme as actually at work, another as in progress on a very small scale, and the rest dormant. Whose fault is this? Sir William Preece was unable to say definitely; but he blamed the timidity of financiers, the iniquity of Parliament in creating joint-stock companies—anybody and everybody but electricians. This unmeasured distribution of blame for the unconscionable gap between what electricians profess and what they are able to practice in the matter of electricity-in-bulk generation, lays the censor open to a damaging retort. Financiers were not always timid in face of the advances of electricians. They believed in them once. How is it that they do so no longer? If it is not a case of "once bit, twice shy," one would like to hear a better reason; but none such was offered by Sir William Preece.

A LESSON FROM THE NEW POST OFFICE TELEPHONE SERVICE.

THE great event of the past week for commercial and industrial England was the issue of the official statement relating to the terms on which the new Post Office telephone system is to be henceforward available for London, and, by trunk lines, for general communication between the Metropolis and the rest of the country. We are not specially concerned with the details of the official scheme, with which "JOURNAL" readers will be by this time acquainted. There are, however, certain observations bearing upon the economics of the scheme which are likely to suggest themselves to those who, like gas and water works engineers, are themselves interested in public service works; and it will be quite worth while to discuss these while the subject is in everyone's mind. In the first place, it must strike the intelligent observer that a universal telephone service, while apparently laid out and organized very much after the fashion of a railway or a gas undertaking, yet differs from these in some determining factors, which the public are only likely to become acquainted with indirectly through the consequential incident of the price of the service. Examination of these similarities and differences very quickly brings one up standing before one of those substantial but vaguely outlined economic principles which puzzle and baffle Communists and many others. The practical question of experimental communism which evokes the spectral form of this

principle is, What public services and supplies can be advantageously nationalized, or municipalized, and what had better remain the subject of private enterprise?

This query is a riddle of the Sphinx. The hare-brained sort of Socialists who mislead Trade Unions and get themselves elected to the London County Council and other not too particular public bodies, survey the vast extent of the existing public service organizations, some of which are already nationalized or municipalized, while others are carried on under statutory regulations in substitution for free competition, and are unable to perceive any distinct line of demarcation between these enormous and far-reaching organizations, and the domain of private enterprise. They are told that there is a difference—not of degree, but of kind—between a public service which it may be expedient to nationalize or municipalize, as the case may be, and one which must remain a subject of private trade; and they fail to see it. They demand that the principle of the distinction shall be defined. This very reasonable request can be satisfied in respect of some concerns, but not for others. Indeed, the more exacting the analysis brought to bear in the quest for this principle, the more elusive it becomes. There is a rather wide and ill-defined border country where no sovereign rule seems to be respected. And very often the true and real objections to nationalization and municipalization bear a strong resemblance to the proverbial "woman's reason"—that is to say, they are assumptions justifiable perhaps by reference to the nature of things and of mankind, not logical deductions from particular facts.

There is an order of logicians, now making themselves heard chiefly in the United States, who strive to put this question of what public services are, and what are not, fit subjects for nationalization or municipalization, upon a firm and defined ground of principle. Such publications as the "Forum" often contain the exercises of this school of statists. In England, the best public opinion remains content to leave the question open—for settlement exclusively on grounds of expediency germane to every particular case. There is at the same time in English statesmanship a good working perception of those public services which, whether they are public property or not, may be advantageously protected from mischievous competition. While recognizing more fully and fruitfully than any other people the truth that competition is the life of trade, Englishmen have learnt to distinguish the spirit from the form in this particular doctrine. They understand that effective, salutary competition takes various shapes for different spheres of action, and that the kind of competition that answers in some enterprises is not suitable for all commercial undertakings. The proper and natural form of competition for a fishmonger is the starting of another fish shop three or four doors off, or across the way. The proper competition for a gas company, however, is not the admission of another gas company to the user of the same streets. In both these examples, in the broadest sense, it is capital which is competing for profitable employment with capital; and the study of statesmen should be to deal advantageously with this capital, as well in the interest of the community as for its own profit and safety.

As already remarked, there is a tolerably firm consensus of instructed opinion in England as to the principles governing the protection of the capital which is required to be sunk in public supply services. There is not, however, and there cannot be, any hard-and-fast prescription as to what kinds of public service should be organized on a basis of centralization. In every such problem, the determining factors are different. In almost every instance of successful centralized organization of a service or a public supply, the determining factor is a saving of expense. So great a preponderance has this consideration usually exercised in favouring such arrangements, that the term amalgamation, or consolidation, carries to most minds the persuasion of saving of capital charges or working expenses, or both, and a presumption of increased efficiency.

It is not universally true; and where it happens to be false, of course, those who have been mistaken suffer disappointment and loss. Not to go into the vexed subject of "Trusts"—which would lead us farther than we can go in this article—examples which need not be named will readily occur to our gas engineering readers, where the presumed economy of amalgamation or concentration has not been realized. We are at the present moment waiting to see whether or not centralization in respect to the provision of poor fuel gas will answer. Certainly, the mere fact of concentrating a service is purely irrelevant to the question of its paying. Here is a striking phenomenon for notice in connection with this line of reflection. There are some public services—rather, perhaps, let us say there is one public service which actually suffers financially from centralization. The more it is used, the more expensive it becomes to the users. The greater its popularity, the higher the cost of working. This service is the public exchange telephone system. This truth, paradoxical at first sight, is nevertheless very easy of comprehension.

In the official statement of the Post Office, explaining how the gigantic undertaking of providing London with an improved telephone service has been arranged, there occurs a significant observation to account for the rates of subscription being higher than those offered by the Postmaster-General for exchanges in other parts of the Kingdom. This is rendered inevitable by the conditions under which the service has to be provided. "It is a well-known fact that the cost of a telephone service increases more rapidly than the number of subscribers. This is due to the fact that the addition of every subscriber's line creates greater complexity in the equipment and working of exchanges." This enormously important and very interesting fact may have been, and probably was, "well known" to experts in the service; but it is quite certain that the possibility of so serious an exception to the economic rule of the price being reduced "on taking a quantity," has never in this connection entered the heads of the people who pay for the service. It is obviously the truth—so plainly, indeed, that, when once stated, it is hard to believe that one had not always been aware of it, which is the test and seal of a great truth. But it will take a long while to convey it to the mass of the people. For proof of this it is unnecessary to look farther than the London newspapers of the period, which, without exception, either miss the point or ignore it.

The most useful of the functions which an ordinary newspaper can fulfil, next to supplying fresh and trustworthy news, consists in preparing crude facts for the indifferent digestive powers of its habitual readers. It is all that can be expected of a Government Department that so solid a fact as this—of the increased cost of telephone exchange services with the amount of the use that is made of them—should be stated in all its naked force. That is the kind of concentrated information which experts in all arts are highly paid to convey to His Majesty's Judges of the High Court, and to other people who are trained to receive knowledge; but it does not answer for popular consumption. Wherefore the newspapers perform a useful task in diluting and peptonizing it. Usually, the "Daily Telegraph" is very well served in this way; its staff being adepts at spreading a three-line telegram out to a column of matter, in which King Solomon, or Pliny, is made useful in explaining the bearings of the original report on the concerns of everyday life. In regard to the new telephone charges, however, this facility of the journalistic mincing-machine has completely failed. Last Thursday's "Daily Telegraph" contained a laborious exercise upon the theme of the new system, which started with the sapient observation that lower rates of charge would probably produce a larger income. Possibly; but the writer forgot the official dictum that the working expenses would be still greater. "In principle," says the newspaper, "the true theory is that of the season-ticket on railways." This is what comes of hunting for analogies without adequate powers of judgment for making a good choice. How would it be if every season-ticket holder wanted a siding of his own?

There is worse, however, to come. Unable to get over his illusion that the rates for private telephone connections must fall when there are more of them, the newspaper writer on the subject boggles over the minimum annual charge for the use of a private telephone, in addition to the annual rental. More experienced observers will notice in this stipulation a significant adhesion on the part of the Government Office to the principle of charging for "making ready," which was advocated in connection with electric lighting by the late Dr. Hopkinson. The idea is that, where a person immobilizes on his own account a certain amount of capital, and requires somebody to "stand-by" in case he should want a service suddenly, it is legitimate to make a charge for the accommodation, irrespective of the extent of the use that may actually be made of it. This really is the justification for a gas-meter rent. It is a payment for a piece of property reserved for private use, and not available generally for earning revenue. The example of the gas-meter is recalled to the "Daily Telegraph" by the instrument which is to be attached to the new subscribers' telephones for counting the number of effective calls, upon which it is remarked: "It seems as though the recorder would be a much more conscientious tally than the gas-meter, which often errs, and, by a strange prejudice, always on one side. There are people who believe in the natural and the supernatural, in saints and sinners; but the man has yet to be born who puts faith in a gas-meter." We will hope that the telephone recorder will gain a better reputation. If so, it is open to be remarked, the average newspaper writer will never get to hear of it. One wonders where this curious race of beings live. Do they ever burn gas, by any chance, that they pay for themselves? This mildewed pleasantry about the gas-meter is a greater bore than the usual reference to the mother-in-law. It is more than time that the self-appointed instructors of the public had in this respect a little of the technical education that they are so prone to recommend to the manufacturers and business people of the country. A simple slot-meter would teach them more than seems to be the adequate amount of scientific knowledge for employment on a Metropolitan newspaper.

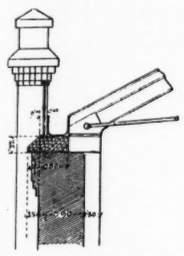
To return, however, to the main purpose of this article, which is to draw attention to the remarkable exception supplied by an exchange telephone system, to the rule which connects the increased use of a service with lower cost. This peculiar working of supply and demand co-exists with the condition that the organized service is not less "expedient" as it becomes dearer. The expediency is merely of another kind than that which is measured by the saving of expense. It is, moreover, beside the mark to complain that a telephone exchange service should be dearer in London than it is elsewhere in England, and dearer anywhere in busy England than it is in sparsely-populated Sweden. There is no "reduction for a quantity;" quite the contrary. But people in general will never understand that. If those who can reasonably claim higher ability than the common to grasp these matters, can learn from this example that all questions of amalgamation, consolidation, organization, centralization, and municipalization must be dealt with on their particular merits, the gain will be considerable.

THE VIENNA MUNICIPAL GAS-WORKS.

(*Continued from p.* 1301.)

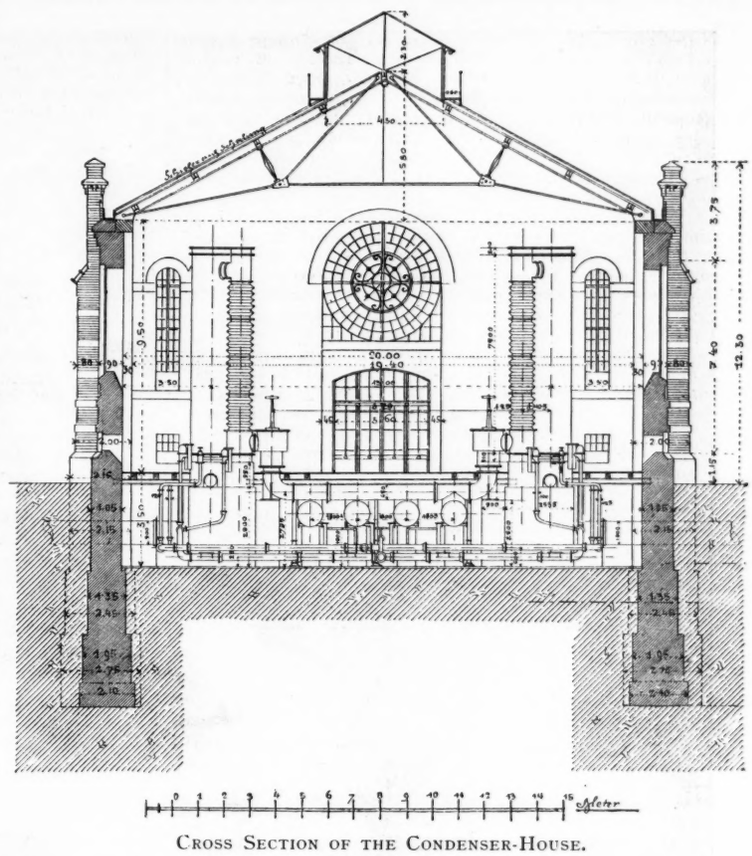
The Condenser House.

This building is parallel to the retort-house, and is 271 ft. 8 in. long and 65 ft. 6 in. wide. From the accompanying cross section, it will be seen that there is a basement, 11 ft. 6 in. in height, in which are all the mains and connections, and the foundations of the condensers. The floor of the basement is a thick layer of concrete, on which rest the columns that support the gangways on the ground floor. The height from the ground floor to the roof-supports is 31 ft. 2 in. The construction of the roof is clearly seen from the cross section. Along the middle is a large lantern for ventilation.



The condensers are arranged in four groups along the walls of the house. Each group comprises two sets of seven cylindrical shells, 27 ft. 2 in. in height. Each shell is nearly 5 feet in diameter, and within it is an inner shell 39 inches in diameter; while through the annular space run twenty Mannesmann tubes, 5 inches in diameter and $\frac{1}{8}$ inch thick. The condensing water circulates through these tubes; and the crude gas is therefore cooled both by the air around the shells and by the circulated water. The cylinders have closed water chambers at the top; and the water circulates under pressure throughout the condensing system. The seven condensing cylinders are connected by means of seven Mohr's cast-iron serrated pipes, 27 ft. 2 in. high, and 27½ inches in diameter at the constricted parts. Within each of these pipes is a second pipe, likewise serrated, and 5 inches in diameter where constricted. This pipe serves for the circulation of water. The outer surface of this pipe is sprinkled with gas liquor, in order to prevent tar settling on it. Each set of condensing plant presents a surface to the gas of 4950 square feet cooled by water, and 6135 square feet cooled by air; and it is intended to deal with a maximum of 2,225,000 cubic feet of gas per diem. Each condensing cylinder has a 5-inch outlet for carrying off the products of condensation. The products are conveyed through a 10-inch pipe to a collecting tank, from which they are pumped to the storage tanks on the other side of the main drain of the Eleventh District, which, as already mentioned, passes through the works.

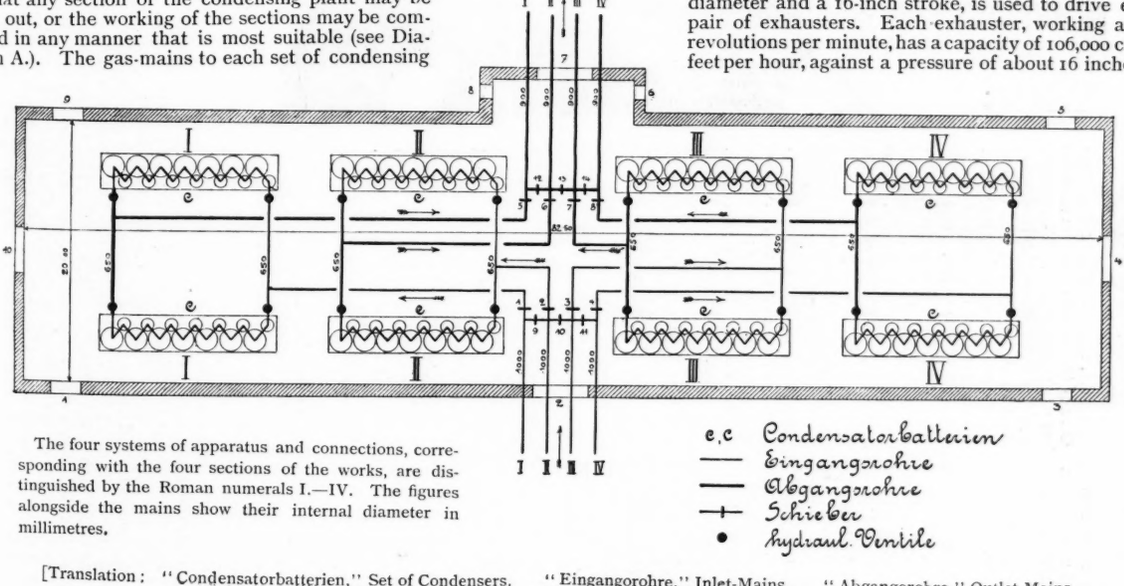
The four 40-inch mains by which the gas travels from the retort-house, are connected directly they enter the condenser house by a cross main. They are then reduced to 36 inches for a short distance before they branch right and left to the condensing apparatus. There are three valves in the cross main, and one in each of the 36-inch prolongations of the inlet mains; so that any section of the condensing plant may be shut out, or the working of the sections may be combined in any manner that is most suitable (see Diagram A.). The gas-mains to each set of condensing plant are 25½ inches in diameter, and each one is provided with a hydraulic valve with a 24½-inch seal; so that any set can be shut out at will. The arrangement of the outlet mains is similar to that of the inlet mains. The plates used for the cylinders were tested under an air pressure of 5 atmospheres, and the finished sets under an air pressure of 24 inches head of water.



Cross Section of the Condenser-House.

Exhausters.

The exhausters, which draw the gas from the retorts and condensers and force it through the remaining apparatus, are in the body of the exhauster house, which is nearly 112 feet long and 75 ft. 6 in. wide. In the wings are an office for the foreman, a small workshop, lavatories, &c. The connections are in the basement, which is 11 ft. 6 in. high. The floor of the exhauster-room above it is supported on concrete resting on an iron framework. The walls are lined with Dutch tiles to a height of 6 feet. Two three-blade exhausters are provided for each of the four sections. The outer drums are 37½ inches in diameter and 37½ inches long, and the internal drum is 25½ inches in diameter. The blades are ½ inch thick. A horizontal steam-engine, having a cylinder 12 inches in diameter and a 16-inch stroke, is used to drive each pair of exhausters. Each exhauster, working at 80 revolutions per minute, has a capacity of 106,000 cubic feet per hour, against a pressure of about 16 inches of

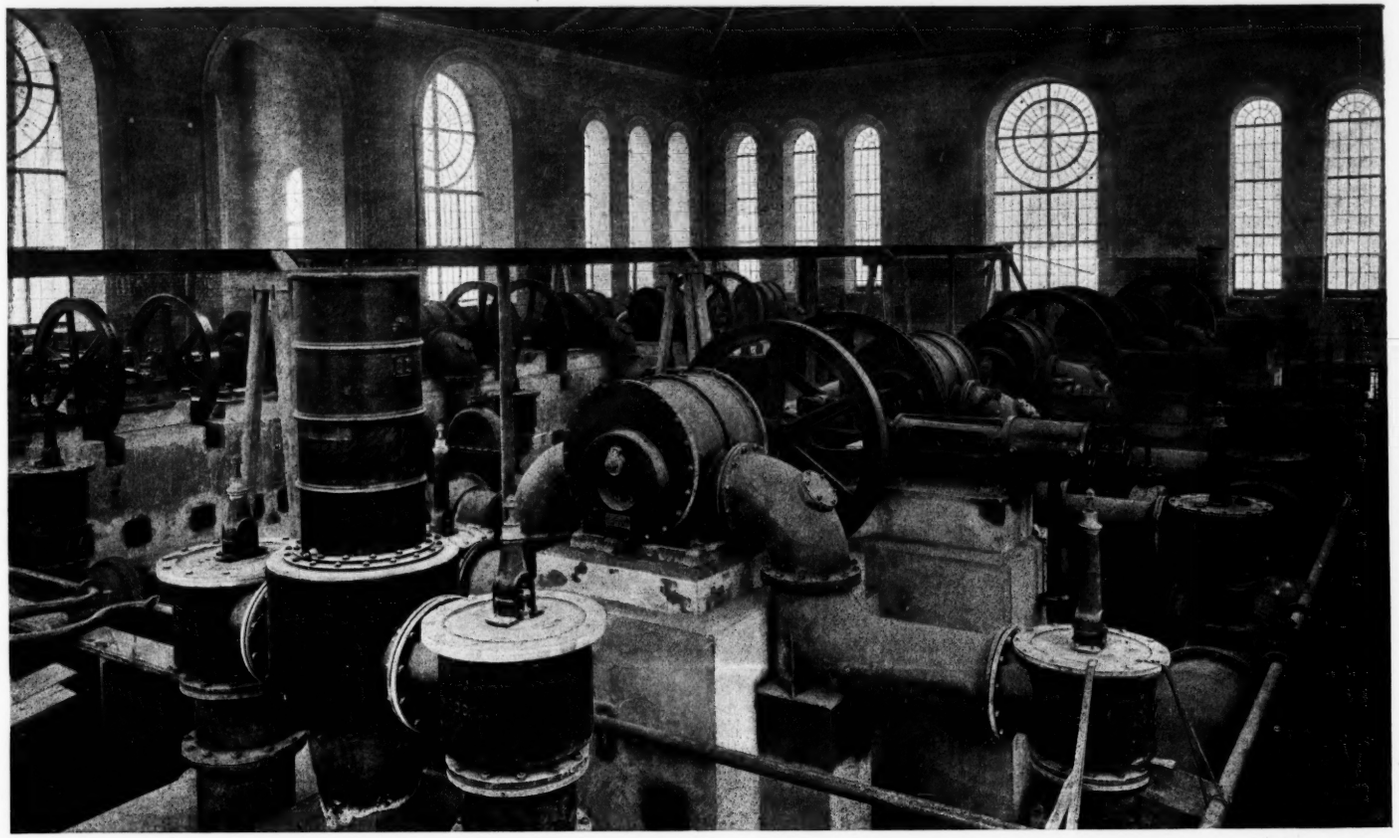


The four systems of apparatus and connections, corresponding with the four sections of the works, are distinguished by the Roman numerals I.—IV. The figures alongside the mains show their internal diameter in millimetres.

[Translation: "Condensatorbatterien," Set of Condensers. "Eingangorohre," Inlet-Mains. "Abgangorohre," Outlet-Mains. "Schieber," Valves. "Hydraul Ventile," Wet Valves.]

Diagram A.—Arrangement of Condenser-House.

water. The eight exhausters and four engines are placed in the corners of the room; and in the middle there are two reserve sets, each of two exhausters and one engine. One of these sets may be at once substituted for either of the other sets. The steam, brought by two pipes from the adjacent boiler-house, is used at a pressure of 6 atmospheres; and the exhausts of all the engines are connected to one pipe. The steam supply to each engine is controlled by a Hahn regulator as well as by the valve. The usual gas-governors are also provided for opening a bye-pass valve between the inlet and outlet mains, in case of any interruption or change of pressure. The four inlet gas-mains enter the building at the south end, and run along the walls to the plant. They are 36 inches in diameter, and are connected by a 36-inch cross main with valves (see Diagram B). The ports of the exhausters are 20 inches in diameter, and can be shut off by dry valves. All the four outlet mains can be connected by means of a 36-inch connection with valves. There are, in all, 46 valves on the connections in the exhauster-house. An illustration is given to-day showing the exhausting plant in course of erection; and reference may also be made to the illustration of the interior of the exhauster-room as given in the "JOURNAL" for March 26 last.



THE EXHAUSTERS IN COURSE OF ERECTION.

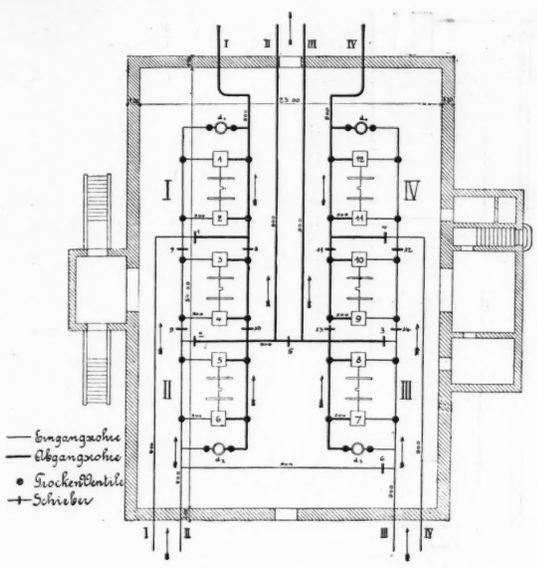
WASHING AND SCRUBBING PLANT.

The scrubber-house has the same dimensions and style as the condenser-house already described. There are provided for each of the four sections two Pelouze tar-extractors. Two more are furnished as a reserve, and are automatically brought into use by means of flap-valves weighted to the normal gas pressure. Each extractor has a capacity of 2,300,000 cubic feet per diem. Two "Standard" washers are provided for each section; and, as a reserve plant, there are two washers of the Fleischhauer pattern, brought into use automatically in the same way as the reserve tar-extractors.

The gas passes from the Pelouze extractors to the Standard washers, which reduce the ammonia in the gas to less than ½ grain per 100 cubic feet. On an average, 1¼ gallons of clean water are required in the Standard washers per 1000 cubic feet of gas; and the liquor leaves them with a strength of from 2·8° to 3·6° Beaumé (about 8 to 10 ounces). The reserve Fleischhauer washers are vessels of sheet iron, 20 ft. 8 in. high, 7 ft. 6 in. wide, and 11 feet deep. They are packed with metal strips on the slope, venetian blind fashion; and these are sprinkled with water or liquor by a tipping bucket device at the top. The gas flows upwards through these washers. Each washer has a capacity of 2,300,000 cubic feet of gas per hour. The inlet and outlet mains to the house are all 36 inches in diameter. The inlet and outlet mains to each extractor and washer are 25½ inches in diameter (see Diagram C). The disposition of the mains and valves of the house is shown in the same diagram. The valves admit in each set or each extractor or washer being shut out as required. The tar and liquor run into two collecting tanks, from which they are pumped into the storage tanks on the far side of the main drain already mentioned, by means of two pumps, each delivering 1320 gallons per hour. The same pumps can also be used to transfer weak liquor to an overhead tank, from which it is run into the Standard washers. A proposal, made after the erection of the plant had been commenced, to modify the washing apparatus so as to adapt it for the recovery of cyanogen according to Bueb's process, fell through because the contracts had already been made. A view of the interior of the scrubber-house was given, together with other details of its arrangement, in the "JOURNAL" for April 2 last.

PURIFYING PLANT.

The original scheme of Herr Herrman embodied the erection of one large purifying house containing sixteen vessels about 40 feet square. Latitude, however, was given to the firms tendering for the provision of purifying plant to submit alternative schemes, provided they were adapted for dealing with a minimum of 17½ million cubic feet of gas per diem, and admitted of every freshly-charged vessel being put in the last position in the series. The firms to whom the work was ultimately given adhered to the number of vessels proposed by Herr Herrman, but adopted a simplified system of connections, by which only 16, in place of 48, valves were required. The scheme contemplates only the



[Translation: "Eingangorohre," Inlet-Mains. "Abgangorohre," Outlet-Mains. "Trocken Ventile," Dry Valves. "Schieber," Valves.]

DIAGRAM B.—EXHAUSTER-HOUSE CONNECTIONS.

employment of hydrated ferric oxide for the removal merely of sulphuretted hydrogen and cyanogen from the gas.

The Constructing Committee decided to have the vessels placed in two houses, with an intervening space, 52 ft. 6 in. wide, for use as a revivifying floor (see fig. 16). Each building is 468 ft. 10 in. long and 64 feet wide, inside measurement, and is divided by a transverse wall into two equal blocks; so that there is in reality a separate purifying house for each of the four sections of the works. The ground floor is occupied by the connections, the columns which support the vessels, and the arrangements for the removal of fouled material. The first floor is 19 ft. 4 in. high, and contains the vessels and the appliances for operating the valves and for raising the lids of the vessels. Above this are two floors, both intended for the storage of purifying material.

The floors are constructed on roofs consisting of rails resting on piers; and those above the vessels are asphalted, in order to prevent the water used in preparing the oxide for use from running through. The roof framing is supported by lattice columns, on which rest plate-girders for carrying the bearers which run parallel with the wall. The roof of the ground floor is partly supported from the sides of the vessels, which are equipped with brackets. On the four corners of each house there are staircases to all floors; while there are additional staircases in the middle to the first floor, where the vessels are.

The purifying vessels are rectangular boxes 39 ft. 4 in. square. The bottoms and sides are of cast iron; the lids being of asphalted iron sheets, which are stiffened by a lattice framing of four longitudinal and four cross girders, 40 inches high, with two secondary rolled 4-inch joists between adjacent girders. A reproduction of a photograph of the interior of the purifier house will show the arrangement. The soundness of each vessel was tested under an air pressure of 24 inches head of water, at which the lid had to withstand a total pressure of about 85 tons. The cast plates for the sides of the vessels are 48 inches square and $\frac{1}{2}$ inch thick, with cast-on cups. The dip sheets of the lid are $\frac{1}{4}$ inch thick, and the roof sheets $\frac{1}{6}$ inch thick. The sixteen ends of the roof girders are clamped by screws to the sides of the vessel, in order to hold down the lid.

There are four rows of grids for supporting the layers of purifying material in the vessels. For the introduction of the material there are four openings, 20 inches wide, in the lid, and over these there are openings in the floors above; so that the material may be brought thence into the vessels by means of flexible shoots. Four openings, also 20 inches wide, are provided in the bottom of each vessel for the discharge of the fouled material into waggons on the tramway which passes directly underneath the openings. These waggons convey it to the revivifying floor, from which lifts raise it to the storage floor. The openings in the lids and bottoms of the purifiers are closed by means of Morton's lids. The vessels are provided with the necessary gauges, test-cocks, and other appurtenances. The available area of a vessel amounts to nearly 1500 square feet.

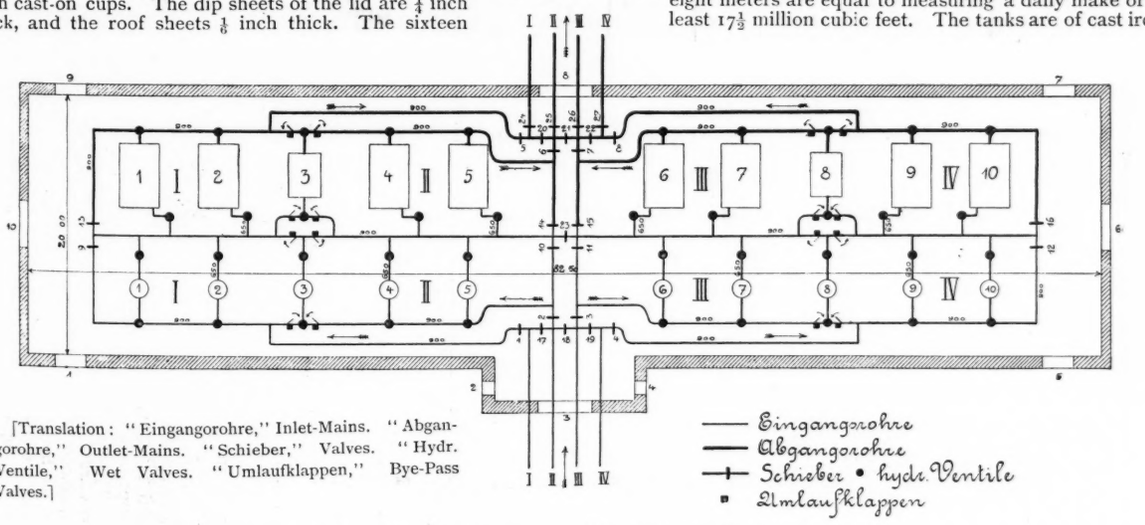
The substructure of the purifiers is independent of the building, and consists of eighteen cast-iron columns, 6 ft. 11 in. high, on which rest four main girders 16 inches deep, which again support eleven girders 8 inches deep, on which the purifiers are directly placed. The lids of the vessels are raised, and the hoists worked, by hydraulic power. The accumulator is in the scrubber house. It has a steel plunger, $10\frac{1}{4}$ inches in diameter and 22 ft. 4 in. high, with a stroke of 16 ft. 5 in. It is loaded with cast-iron plates. There are two duplex steam-pumps, with plungers $2\frac{1}{2}$ inches in diameter, which deliver 33 gallons of water against a pressure of 60 atmospheres. The lids of two purifiers can be raised simultaneously.

The working of the apparatus can be followed by reference to the longitudinal and cross sections. A hollow column extends from the ground floor to the ceiling of the first floor. Its lower half is 16 inches in diameter; its upper half 12 inches. On it slides the cyclinder of a hydraulic press, $23\frac{1}{2}$ inches outer and $17\frac{3}{4}$ inches inner diameter. This carries the lid of the purifier, weighing nearly 19 tons. The water, at 60 atmospheres pressure, flows in at its base to the hollow space in the column, which it fills, and then passes through holes at the junction of its different sized halves into the hollow space of the cylinder. The reduction of the size of the column at its upper half gives a greater cross section of water on the upper than on the lower side of the pressure cylinder. Therefore the cylinder, together with the attached lid of the vessel, is raised. The operation is controlled by an ordinary type of slide valve, actuated by a hand reversing lever. At its highest position, the lid is automatically clinched by two hooks on the column, which retain it in that position independently of the hydraulic press. As soon as the lid has reached the highest point, the water is automatically shut off. Up to now, this hydraulic lifting apparatus has answered very well.

Each purifier requires about 130 cubic yards of material to fill it. On account of the hydraulic apparatus for raising the lid, there has to be a second cup and dip in the middle of the vessel. The lid is guided by means of two forked projections, which run on guide-rails attached to two of the lattice columns supporting the roof. The scheme of the connections to the vessels is shown in Diagram D. The whole of the connecting mains are 36 inches in diameter. At the end of each main there is a safety seal-pot, with a 16-inch pipe leading into the open air above the roof. The object of this arrangement is to prevent a rise of pressure blowing the lutes of the vessels, and thus allowing gas to escape into the building.

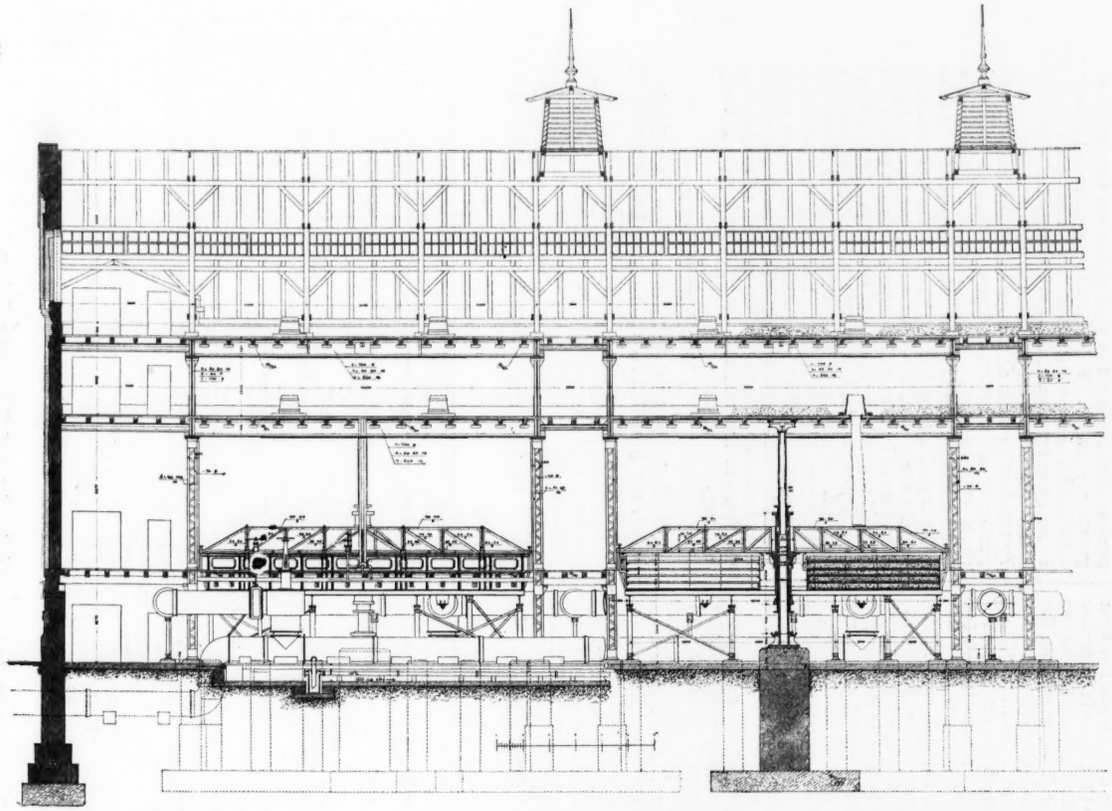
THE METER-HOUSE.

Two station meters, placed opposite one another in the meter-house, are provided for each of the four sections of the works; and may be used either one at a time or simultaneously. The diameter of each meter is 14 ft. 1 in.; its depth is 15 ft. 1 in.; and its drum has a capacity of 1320 cubic feet. At 80 revolutions per hour, each meter passes 106,000 cubic feet of gas; hence the eight meters are equal to measuring a daily make of at least $17\frac{1}{2}$ million cubic feet. The tanks are of cast iron,

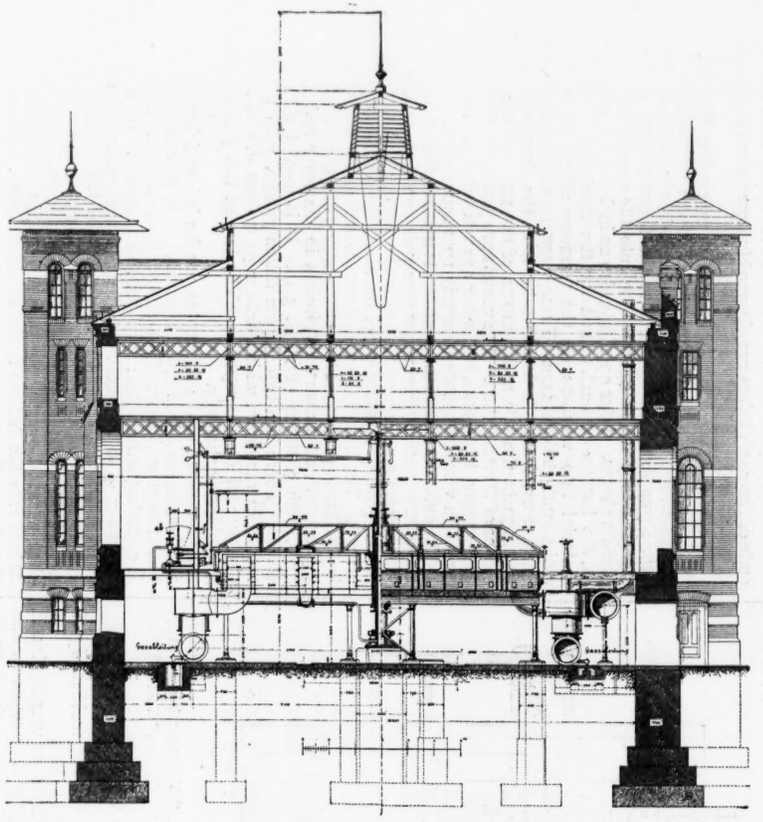


[Translation: "Eingangorohre," Inlet-Mains. "Abgangorohre," Outlet-Mains. "Schieber," Valves. "Hydr. Ventile," Wet Valves. "Umlaufklappen," Bye-Pass Valves.]

DIAGRAM C.—CONNECTIONS OF THE WASHING AND SCRUBBING PLANT.



Longitudinal Section of Purifier-House.



Cross Section of Purifier-House.

with the joints carefully planed. On the bottom of each is fitted a settling box, provided with a discharge valve. There are four partitions in the drums. The partitions are of tinned-iron sheets, $\frac{1}{8}$ inch thick.

The faces of the meters have the usual index, with seven dials, thermometer, pressure-gauge, clock, and recording apparatus. At the back are the inlet and outlet connections, the water inlet and overflow, lubricators, and other accessories. Pressure-gauges connected to the inlets and outlets of each meter are mounted on one pedestal in the meter-house. The disposition of the connections and valves in the meter-house is shown in Diagram E. The four 36-inch mains from the purifying house are all connected by a 48-inch cross main, which is provided with three valves; while there are also valves in the 36-inch connections on both sides of it. The arrangement of the outlet connections from the meter-house is similar; but the outlet mains are 48 inches in

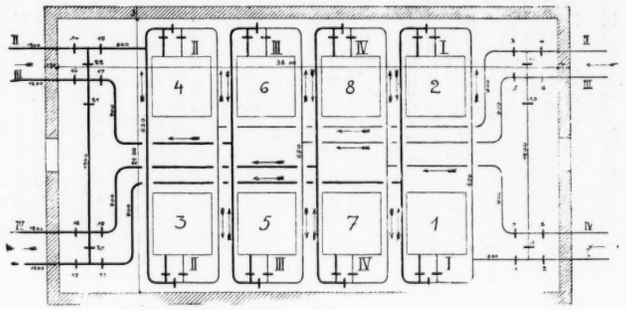
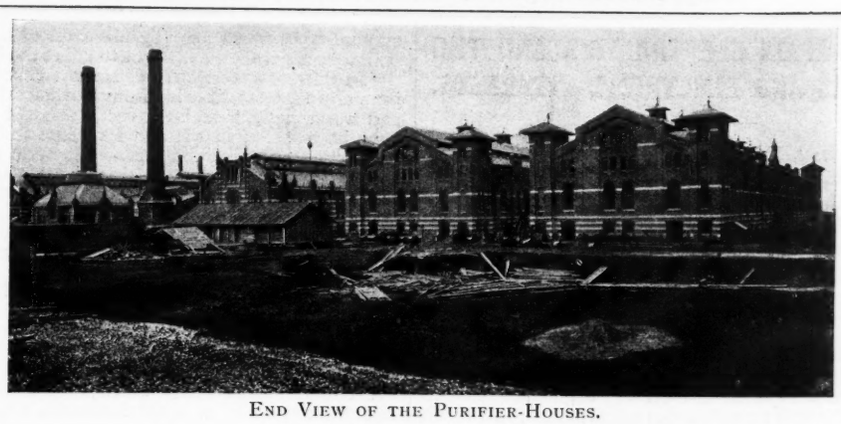


Diagram E.—Meter-House Connections.

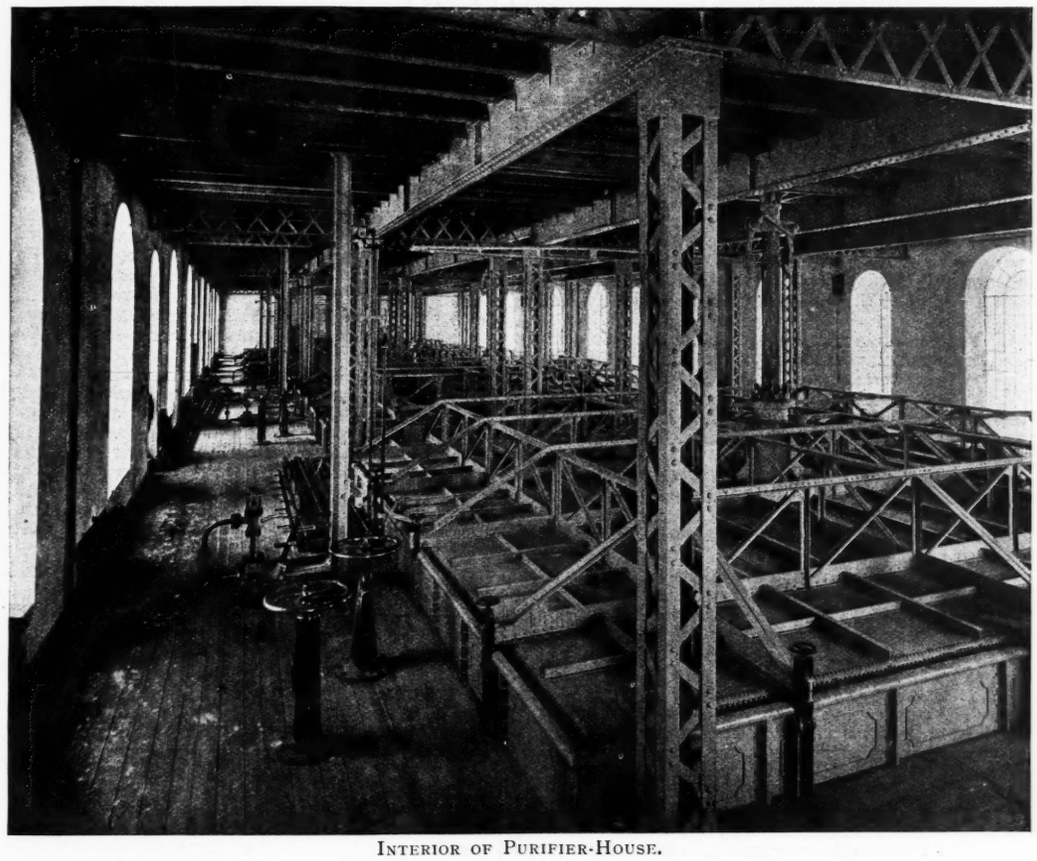
diameter. The 36-inch inlet mains are each jointed to a 25½-inch main, which runs round the pair of meters belonging to the section, and is connected to their inlets and outlets. There are in all 46 valves in the meter-house, all actuated by hand-wheels. For facilitating the work of the valve-men, there is provided an electric recorder of the positions of the gasholders.

The meter-house consists of a ground floor room nearly 125 feet long by 65 ft. 7 in. wide, and 27 ft. 2 in. high to the roof supports. A view of this floor was given in the "Journal" for April 2 last. There is a basement, about 13 feet high, in which all the connections are exposed and readily accessible. The subsoil at the spot selected was found to be particularly unfavourable; and a firm foundation had to be secured by means of a continuous bed of concrete 32 inches thick.

(To be continued.)



END VIEW OF THE PURIFIER-HOUSES.



INTERIOR OF PURIFIER-HOUSE.

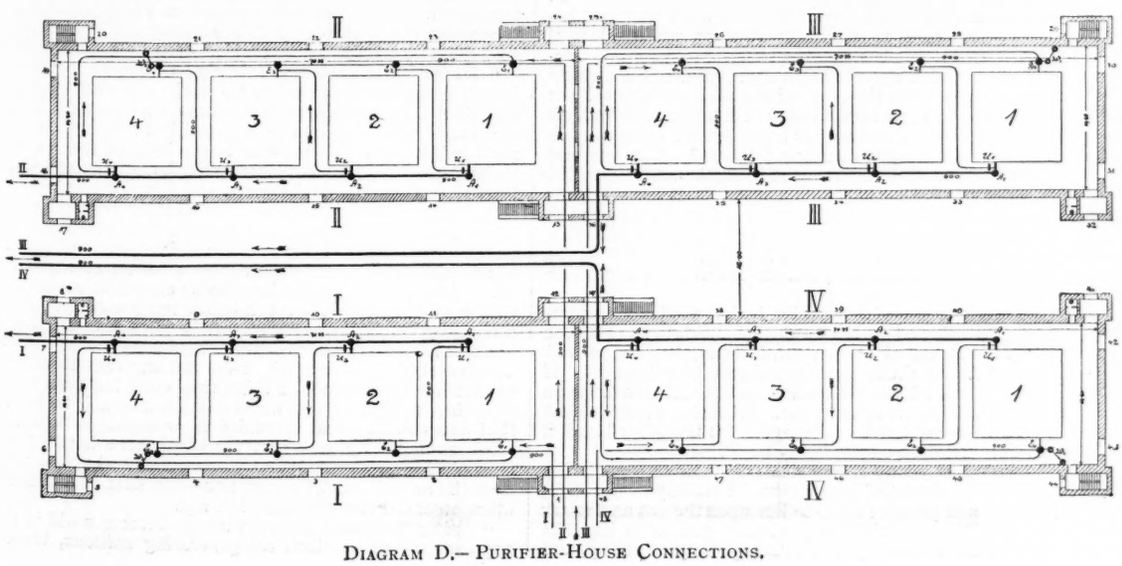


DIAGRAM D.— PURIFIER-HOUSE CONNECTIONS.

AN ELECTRICIAN ON ELECTROLYSIS AND THE LINKING OF GAS AND ELECTRICAL INTERESTS.

Mr. C. H. Wordingham, M.Inst. C.E., who will be known to our readers as the late Electrical Engineer of the Manchester Corporation, is this year the Chairman of the Manchester Section of the Institution of Electrical Engineers; and last Tuesday evening he inaugurated his year of office by an address which we have found some amount of interest in perusing.

Matters in which the members of the Section are concerned from a purely domestic point of view occupied a considerable part of the introductory pages of the address. But when at length we arrive at the technical portion of the Chairman's utterances, we find it opens with an admission (with which we are pleased to agree) that the development of electrical engineering in this country is passing through an extremely critical period; and much depends upon the attitude assumed by every individual member of the profession. Looking into what follows, we find that Mr. Wordingham has little patience with those electrical engineers who go abroad, applaud all they see, and then return home and decry the position of the electrical practice and productions of their own country, and advertise those of the country's rivals. The why and the wherefore of low prices and early delivery of plant sent from abroad into this country are then discussed, but as to the alleged inferiority of English-produced machinery, he writes that down as an absolute delusion. To his mind, one thing is certain—that electrical manufacturers must join hands and combine in order to lower prices, and so drive away the competitors who now menace their very existence, even though for a period they should be compelled to face exceedingly lean times.

The two faults of electrical engineers—the tendency to rush to extremes and the want of foresight—which appear to Mr. Wordingham to stand out prominently, form the text for another considerable section of the address. In the extreme views held on the subject of municipally *versus* privately governed undertakings, the Chairman found material for supporting the first charge. He himself, however, holds the balance so evenly as between municipal and company controlled undertakings that any one seeking guidance from him will be left in doubt as to which form of government is, after all, the best, though there peeps out, here and there, a little leaning on his part towards the municipal side. Leaving this instance of the tendency to rush to extremes, Mr. Wordingham turns to another, "in which zeal has been allowed to outrun discretion and common sense;" and here we find something that intimately concerns our readers. Here is what he says.

"During the past year, much commotion has been caused by the action of certain gas and water companies in the matter of possible danger from electrolysis arising from the operations of traction systems. The tendency mentioned has been evinced by both parties to the controversy. On the one hand, the gas and water companies, not satisfied with protecting their property, have sought to impose conditions which would make it commercially impossible for electrical engineers to carry out their work; while on the other, electrical engineers have sought to repudiate responsibility altogether.

"Let us look at the position impartially for a moment. Immense sums of money belonging to communities or to individual shareholders are invested in gas and water pipes laid underground, on the due maintenance of which depends the distribution of such a vital commodity as water, and of such a universally employed agent as gas. There arises a new industry which necessitates the passing of electric currents through the soil in which these pipes are laid. It is known that, under certain conditions, these currents may damage the valuable property already in existence. Is it to be wondered at if those responsible for such property become alarmed, and seek to insure themselves against loss if damage should occur? It is urged that, if the promoters of electric traction comply with certain arbitrary regulations drawn up by the Board of Trade when the state of knowledge of the subject was far less complete than now, they should be exempt from all liability for damage caused, no matter how great this may be. Is this position consistent with common fairness? The gas and water companies have, with the sanction of Parliament, expended their money in order to meet public wants. Is it just that another company—who no less, but no more, than they serve the public—should be allowed to conduct their operations in such a manner as to destroy their property? All parties should be granted the free use of the soil; but no one of them should be allowed to damage any other.

"Surely, the only reasonable position is that the traction companies should be allowed to carry out their work in the manner sanctioned by the Board of Trade; but, if damage can be proved to have been done by them, then they should bear the cost. If the traction companies have the confidence in the Board of Trade regulations which they profess to have, they certainly cannot object to this, because they will do no damage. On the other hand, if they do the damage, they ought to pay for it.

"It is objected that many bogus claims for ordinary corrosion will be made on the electrical companies. This may be so. But, after all, the onus of proof of damage lies upon the gas and water companies; and the electrical engineering profession has not hitherto proved itself lacking in either ingenuity or ability, and may safely be relied upon to take care of itself. At all events, such a consideration ought not to affect the broad question.

"In this controversy, the disastrous effect to electric traction generally that would arise from a wholesale destruction of gas and water pipes, if such destruction should take place, seems to have been lost sight of; and I venture to think that those who point out the danger and enforce attention being paid to it now, are far greater benefactors to the profession than those who vociferate that there is no danger, and urge on traction companies to what might be ultimate ruin. There is no doubt that, if the danger is recognized now, it can very well be avoided; for a much lower limit of drop of potential than that allowed by the Board of Trade can easily be worked to."

We may turn now to the second of the failings to which Mr. Wordingham alluded—the want of foresight. He gives as a striking instance the recent extensive promotion of Bills for the establishment of companies to generate electrical energy and distribute it over large districts. "No doubt," he says, "there are circumstances under which they may be advantageously undertaken; while, in other instances, it is difficult to see any justification for them. In any case however, it is certain that they will require for their carrying out enormous quantities of plant of very large calibre. This demand is suddenly sprung upon our manufacturing firms. Can we expect that they will be ready to undertake the work? Surely, the better plan would have been to have provided the capital first to extend existing companies, or even establish new ones, for making the plant, and then to have promoted the power companies to purchase this plant. . . . I greatly fear the course adopted will result in the orders going abroad through the unfortunate want of foresight in thus putting the cart before the horse; the labour and enterprise expended by the promoters of the schemes availing thus only to increase the prosperity of our commercial rivals."

The Chairman might have adduced many examples of want of foresight; but he only alludes to one other, and that is the way in which central stations are so often designed. In the early days of public supply, it was not surprising that the demand should be under-estimated and stations be put down on a totally inadequate scale. But, now, in the light of accumulated experience, it is astonishing to see the initial instalment arranged for apparently without any regard to future increase, or if such increase be allowed for at all, it is of extremely limited extent. Over and over again, one sees designs of such a character that it is physically impossible for the station to grow; and within a few years an entirely new station will have to be provided.

In concluding the address, time only admitted of the Chairman touching very briefly on one or two of the problems most likely to occupy the attention of the electrical profession in the near future; and from this part we make some extracts:

"One matter which was mooted in the early days of the electrical industry has come into great prominence in this country during the last two years—namely, the supply of electrical energy over large areas, including small and scattered towns and villages. It does not appear, however, as though the method by which this is to be accomplished has received the consideration it deserves. In place of the problem being gone into thoroughly, it seems to have been assumed that a few enormous generating stations, supplying in some cases to distances of twenty miles, must be the right thing; and there has been vague talk in which coal, gas-engines, gas-producers, recovery-plant, revision of Board of Trade regulations, and so forth have figured obscurely. These hazy ideas, eked out with violent vituperation against everyone venturing to offer opposition, have given the impression that the difficulties have all been solved, and that it only remains to carry out the work. No explanation has been vouchsafed as to how the superposition of a number of similar demands, each with a low-load factor, is going to give as a resultant an improved load factor, or why a number of inherently unprofitable towns, when connected together by mains (interest charges on which represent a large proportion of the total probable revenue), will be converted into a gold mine by the use of the magic words 'supply in bulk.'

"Granted that gas-engine driving with producer gas in conjunction with recovery plant, gives the cheapest production of electrical energy, what evidence have we that such engines will enable alternators to be run in parallel satisfactorily under working conditions; and it must be borne in mind that long-distance transmission must almost of necessity be by alternating currents. Recovery plant no doubt gives excellent results on a 100 per cent. load factor; but its successful working requires nice adjustments among all its parts, and its capital cost is high. What will be the effect of the sudden fluctuations of demand incidental to a central station, and how will the question of cost be affected when the interest charges have to be earned in an actual station with a load factor very much below 100 per cent.? Again, is it remembered that, in order to get the necessary for the recovery plant at a low cost, about one-fourth of the generating plant must be preserved at all loads? I do not say that these difficulties cannot be surmounted. I think they can; but I do say that we have heard little of the way in which they are to be met, and that meanwhile great mischief is wrought to less ambitious schemes by the Utopian pictures which have been presented to the public of power supplied to consumers at prices no greater than the actual cost of generation—the cost of distribution and other essential charges being left out.

"That gas-engines driven with producer gas will in the future supplant steam in electrical generating stations, there can be

little doubt. But their use will not be confined to stations of abnormal size; for their inherent advantages are very great. The consumption of fuel is but little more than half that of steam-driven plant; and the cleanliness and compactness of the system, coupled with the reduction of radiation and stand-by losses, render possible great strides in the direction of cheapening electrical energy even in very small stations.

"There is one method of supplying small towns and villages which has not, I think, been put forward, but which might prove a cheap and easy solution of giving to them the advantages of electrical energy. There are few towns so small as not to have a gas-works. Why should not the gas company establish producer plant, and sell the gas to a locally formed electrical company or to the local authority to use for driving electric generators. I should deprecate the gas company undertaking the electrical portion of the business themselves, partly because their staff would not have the necessary experience, and partly because they would be tempted to stifle the electrical work. On the other hand, if the course I suggest were taken, each portion of the work would be looked after by those most competent to deal with it; and it would be to the interest of both parties to make the electrical undertaking succeed, for the gas company could make as great a rate of profit on the producer gas as on the ordinary lighting gas, while still enabling the electrical company to produce cheaply.

"In considering this matter, it must not be forgotten that the preparation of producer gas for gas-engines is by no means a simple matter; and if to this be added an ammonia-recovery plant, a considerable amount of skill is required on the part of those looking after the manufacture. This skill is available in gas-works; and for this reason it would pay to put down recovery plant for producers working on a much smaller scale if the operations are carried on in connection with such works than if the plant were isolated. This extension of the gas company's make would not be at the expense of their existing business; for it is a matter of experience that the introduction of the electric light sets a higher standard of illumination, and actually increases the demand for gas for ordinary purposes. Hence the introduction of the electric supply would be a clear gain to the gas company.

"Gas engineers who are not wilfully blind to events must recognize that the public likes electric light and power if it can get them at a reasonable cost. It would be far wiser for them to accept the inevitable, and, by joining hands with those they now look upon as enemies, participate in this new outlet for their enterprise. Electrical engineers on their part would do well to recognize that gas engineers can help them, and to invoke their assistance in the application of gas for the production of electrical energy."

The Chairman was compelled to leave untouched (owing to the length of the address) many matters that he might well have included; and we are compelled, through pressure on our space, to abbreviate the address itself to the foregoing extent, though in several respects the unnoticed matter possesses an interest for many outside the electrical profession.

SOME DEFECTS OF FOREIGN PATENT SYSTEMS.

THE shortcomings and defects of the English Patent Law are a favourite theme for the animadversions of certain critics, who never weary of vilifying the national system and lauding those of other countries, especially the Patent Laws of Germany and the United States. While it is probably true that our own existing patent system, being firstly a human invention, and secondly a product of growth, is not ideally perfect, it is only when one examines the conflicting and hopelessly irreconcileable prescriptions of its self-appointed critics and would-be improvers, that one realizes how difficult it is to devise a thoroughly unobjectionable system to take its place. Not to go into this part of the question for the present, it will be interesting to those amateurs of Patent Law who are inclined to award preference to foreign systems—usually upon second-hand and imperfect information—to chronicle one or two matters that have lately come into notice as illustrations of the defects of both the German and the American patent systems. Taking the former first, it will be remembered that a tentative scheme of improvement in regard to the practice of the English Patent Office actually awaits authoritative sanction. It was dealt with in the "JOURNAL" at the time of the presentation of the report of the Departmental Committee, last March (see Vol. LXXVII., p. 807). Recently, however, a prominent section of English Patent Law reformers have made it known that, in their opinion, nothing short of the German system of official examination for novelty will serve any useful purpose.

Without discussing at length the question thus raised, it will be pertinent to remind those who are in favour of a thorough official search for anticipations as a condition precedent to the grant of protection for an invention, that such a system, in order to be fair, implies infallibility on the part of the office. This is obviously an impossible assumption. Yet in practice it has to be admitted under the German system. A case in point was lately reported, where grave wrong was done to an applicant for a German patent through an error perpetrated by the office. A German Court of Justice found that this was so; but there was no redress for the unfortunate victim of bureaucratic blundering. Any individual hardship could not be allowed to disturb the symmetry of official performances. This state of affairs might pass in much-governed Germany; but it is safe to say that nothing of the kind could be tolerated in this country. No English Government institution which did a wrong to a subject, and was not amenable to the declaration of the right by a High Court of Justice, would endure another day.

As regards the American patent system, it is very remarkable that hardly any independent native opinion of its merits is available for reference. Most of the English information respecting it is based upon the interested statements of patent attorneys in the United States. In these circumstances, special value attaches to a report by Mr. C. H. Duell, a Commissioner of Patents in the United States, upon the "Development and Defects of the American Patent System," recently published in the "Engineering Record." It is rarely indeed that a responsible American ventures to place himself upon record, as they say, as a fault-finder with one of the great national institutions. When he does, it is for good and very sufficient reason. Indiscriminate abuse of one's own country and everything belonging to it, is an exercise of an exclusively British virtue. Mr. Duell is a believer, not only in patent systems on principle, but also in the American system in particular, which he credits with being more than anything else that could be named the cause of the industrial revolution of his country during the past century. How great this change is, may be realized from his statement, that, whereas up to the time of the Civil War the country continued to be mainly agricultural, and consequently relied largely upon the importation of manufactured goods, to-day the balance has altered, and there is an excess of exports of such articles.

Mr. Duell thinks that the cause of this change lies in the economy of manufacture arising from the use of labour-saving devices, chiefly of native invention, which has set off the higher cost of labour. And, as already stated, he looks upon the patent system as the *causa causans* in this connection. The proposition might be disputed; but for the present it may be allowed to stand. Mr. Duell gives a short history of the successive Federal Patent Laws, which were rounded off by an Act passed in 1897, and now in force. The period for which United States patents are granted (17 years) dates from 1861; and although there is power to extend by Act of Congress, this has never been exercised in the case of a patent granted for the full period. The official examination of applications was always part of the system after 1836; but it was not regularized before 1870. The most important provision of the Act of 1897 was that foreign applications for United States patents must be within seven months of the original application for protection in any other country.

Mr. Duell remarks that the official examination is the soul of the American patent system, and is that which distinguishes it from nearly all others. He regards the examination system as the ideal one, subject to the important qualification that the examination can be made with sufficient care to minimize the likelihood of the issue of patents for inventions not of a patentable nature. He admits, however, that the field of search yearly increases, and it becomes more and more difficult, through lack of time, to make a perfect examination. Something more than ten million domestic and foreign patents have been issued; while the number of scientific publications has enormously increased. Already it is only by means of a perfect classification, that this great mass of matter can be so divided as to be conveniently accessible for use in the examination of any individual case. And, according to the theory of the American system, every application for protection has to be tested for originality by the thorough and discriminating application to the subject-matter of all this extant information. Are the facts, one may reasonably inquire, in harmony with the theory? Bearing in mind the condition that no responsibility attaches to the decision of any official examination system, the American or another, is it humanly possible for the working of such a system to be approximately perfect? If so, is the degree of approximation likely to rise or fall, as the weight of significant matter to be brought into play increases year by year?

Mr. Duell does not offer an opinion on this aspect of the subject; but impartial observers will have little difficulty in arriving at the judgment that the absolute value of unlimited official examinations into anticipation and utility is likely to fall, if only for physical reasons, until the work ceases to be worth doing. Even as it is worked now, he admits that the system is imperfect, and that the examination is not even so reliable as it might be. The practice of the office lacks stability and uniformity, by reason of the frequent changes of Commissioners, which prevents the establishment of definite policies. This is a question of politics. Even worse, however, is the abuse of the liberty to appeal, and the onerous and complicated character of the procedure in regard to interference cases due to the number of motions and appeals provided by the laws and rules. A critic might ask if this is not a result of the attempt to work the examination system? A yet more serious evil is the frightful delay in getting applications through the office, owing to dilatory proceedings under the rules regulating amendments. The Act of 1897 has provisions intended to cure this evil; but they have failed to do so. At present, about 75 per cent. of the patents granted are issued within a year from the filing of the application; but the exceptions are probably more important than the ordinary run of entries. The great majority of patents issued in all countries are worthless; and if the few valuable ones should be involved in the failures of the system, the

injury is not to be measured by the arithmetic of averages. Mr. Duell gives examples showing that, under the present United States system, an application can be kept alive indefinitely, if this is desired. There are applications still pending in the office, which were deposited prior to 1880. There are nearly 5000 applications over three years old. This is clearly no credit to the system.

Other points referring to defects of the American patent system might be mentioned; but the above statements, on the authority of a Commissioner, will suffice to give pause to those amateurs who might too readily consent to the proposition to make the English patent system conform to the American.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1401.)

THE Stock Exchange has had another quiet week. This phrase indeed might almost be stereotyped for weekly use, so persistent is the calm. And the general tendency, although pretty fair at the opening, soon became dull, and remained the same (more or less) to the close. With the sole exception of the American railway market, it was difficult to find in any department a bright ray to alleviate the dulness. However, prices were not very seriously reduced, except in one or two instances which were subject to special circumstances confined to themselves. In the Money Market, there was a slight but steady hardening, and rates closed decidedly firm, and with a fair show of keeping stiffish for awhile. In the Gas Market, the course of business was very much on a par with the run of things in the previous week—to wit, a fair amount of dealing in a number of stocks distributed through the list, without a heavily preponderating rush of attention to any single issue. And the general tendency, too, was much the same, being firm and strong. Almost every stock dealt in showed a degree of buoyancy which often culminated in a pronounced advance. In Gaslight issues, the ordinary stock was rather quiet at first; but it roused up well before the close. The tone was strong from the start; and by Thursday it touched par. Several gallant attempts were made to reach a premium, but unsuccessfully; and the closing mark was 100. The secured issues were not conspicuous, and were unchanged—harder money perhaps checkmating the chance of a rise. In South Metropolitan, there was a little dealing daily; but there was no strength in it, and prices were never better than middling. Commercial was strong; and the old stock had a nice advance. Very little indeed was done in the Suburban and Provincial group; and there was no movement whatever in quotations. The Continental Companies were decidedly quiet, with the important exception of Imperial, which was quite roused into activity. But they were all in good form; and both Imperial and Union had a moderate improvement. There was nothing to remark about the remoter undertakings beyond a slight reduction in River Plate. Business in the Water Companies was only on its usual scale on most days; but on Wednesday, there was extensive dealing in Lambeth and Southwark. The general tendency was extremely good; and several issues had a moderate advance. Kent was rather fiddled about—put up 3 one day, and put down 1 the next.

The daily operations were: Business in Gas opened rather sluggishly on Monday, and transactions were not numerous; but the tone was good. Gaslight ordinary and Imperial rose 1 each. Tuesday was more brisk, and equally firm, with no change in quotations. In Water, Southwark preference improved 3. Wednesday showed the same condition of things. Commercial old advanced 3, and Imperial 1. In Water, Southwark and Kent gained 3, East London 2, and Grand Junction 1. Thursday was strong and active. Continental Union rose; but Kent Water fell 1. Friday was firm and buoyant generally; but River Plate fell ¼. In Water, Grand Junction rose 1. Saturday was steady and unchanged.

Book-keeping for Gas-Works.—We have received from Messrs. John Allan and Co., of Ludgate Circus Buildings, a copy of the above work. It is a reprint of a series of articles contributed to the "Gas World" by Mr. Charles Sandell, whose name is too well known as a gas accountant to necessitate a detailed notice of his work. The author does not claim any novelty for his system, but simply offers it as a useful model, guide, and assistant to secretaries, accountants, and auditors of gas companies.

Manchester District Institution of Gas Engineers.—The 128th quarterly meeting of the Institution will be held at Wakefield, on Saturday. We learn from the programme issued by the Hon. Secretary (Mr. J. Wilkinson, of Sheffield) that, after partaking of light refreshments to be provided by the Directors of the Gas Company at the offices, the members will assemble at the gas-works at noon, and, under the guidance of Mr. H. Townsend, the Manager, will inspect the works and plant, the chief features of which are the installation of inclined retorts and the De Brouwer coke-conveyor. At the close of the visit, the members will be conveyed to the Strafford Arms Hotel, where they will be entertained at luncheon by the Directors. In the afternoon the business meeting will be held. The items on the programme comprise the election of four new members, a President for next year in succession to Mr. Charles Wood, and the reading of two papers—one by Mr. Townsend on the gas-works which he so ably conducts, and the other by Mr. E. H. Hudson, of Normanton, on "The Control of Chimney Draught."

PERSONAL.

Mr. WILLIAM J. RUSSELL, the Secretary of the Croydon Commercial Gas and Coke Company, has, on the advice of his doctor, resigned his office as from the 31st of December, after 39 years' service; and the Directors have elected him (as from that date) to fill the vacancy on the Board caused by the death of Mr. Allen John Lambert. They have also promoted Mr. JAMES W. HELPS to the office of General Manager and Engineer, and Mr. WILLIAM W. TOPLEY, Assistant-Secretary, to that of Secretary, from the same date.

In consequence of the retirement of Mr. J. Reeson from the position of Assistant-Secretary and Registrar of the Gaslight and Coke Company, to which reference is made below, some changes have been made in the office staff. Mr. JOHN HATCHWELL, late Assistant-Registrar, formerly of the City of London Gas Company, and for 32 years Mr. Reeson's colleague in the Transfer Office, has been appointed Registrar; and Mr. HENRY RAYNER, who was associated with him throughout his period of service as Assistant-Secretary, succeeds him in that capacity.

An interesting event took place at the Great Yarmouth Police Court on the 16th inst., when the Mayor (Colonel Diver) presented to Mr. CHARLES PANCHEN, the Secretary of the Gas Company, a testimonial on vellum from the Royal Humane Society, in recognition of his bravery in rescuing a boy from drowning. The testimonial ran as follows: "Resolved unanimously, that Charles Panchen is justly entitled to the honorary testimonial of this Society engrossed on vellum; and it is hereby awarded to him, he having on August 18th, 1901, gone to the rescue of Ernest F. Bransby, who was in imminent danger at Yarmouth, and whose life he gallantly saved." This is the third award Mr. Panchen has received from the Society; the first being a bronze medal in 1877, and the second the Society's clasp in 1883. The Mayor expressed his great pleasure in conveying to Mr. Panchen the Society's recognition of his bravery; adding that his gallant action was highly appreciated. Mr. Panchen thanked the Mayor for the kind terms in which he had alluded to his service, and said he hoped that what had fallen from his Worship would lead to emulation by others.

In our notice last week of the death of Mr. Charles Ball, the well-known Parliamentary Agent, we mentioned that it was through Mr. Ball, in conjunction with Mr. W. A. Valon, that what is known as the "Yeovil clause" became a recognized part of parliamentary practice in connection with the transfer of gas undertakings to local authorities. It has been pointed out to us that the name of Mr. Thomas Newbigging, M.Inst.C.E., should be added jointly to those of Mr. Ball and Mr. Valon as being responsible for the clause in the Act securing compensation to the officers of the Yeovil Gas Company, and which has been adopted in subsequent Acts. The following was the "JOURNAL" reference to the matter at the time the Yeovil Bill was passed: "It is fitting that gas managers throughout the kingdom should know the names of the professional gentlemen engaged in this Yeovil Bill, to whose thoughtfulness they, as a class, are indebted for this signal boon. They are: For the Company, Mr. W. A. Valon, Mr. T. Newbigging, and Mr. Corbet Woodall as Consulting Engineers, and Mr. Balfour Browne, Q.C., Mr. Freeman, Q.C., and Mr. Lloyd as Counsel. The Parliamentary Agent is Mr. John C. Ball. For the Corporation (who agreed to the terms) there appeared Mr. E. H. Stevenson as Consulting Engineer; and Mr. Worsley Taylor, Q.C., Mr. Moon, and the Hon. F. Thesiger as Counsel. Messrs. Dyson and Co. were the Agents."

After a connection extending over a period of 42 years, Mr. JOSEPH REESON, the Assistant-Secretary and Registrar of the Gaslight and Coke Company, has just retired from their service. Mr. Reeson entered the Secretary's office as a junior clerk in 1859; and on the appointment of the late Mr. J. Orwell Phillips as Secretary, in 1862, he became his immediate Assistant. Thenceforward he was actively employed in connection with all the important events initiated by Mr. Phillips, which resulted in the establishment of the Beckton works, the absorption by the original Company, by amalgamations, and in one case by purchase, of eight additional undertakings, and the introduction of a large number of the provisions relating to the supply of gas which have been enacted during the past thirty years and upwards. He was also Clerk to the Joint Committee of Secretaries who represented the Metropolitan Gas Companies in connection with the parliamentary inquiries which led up to the legislation of 1868. In that year, in which were passed the Company's Act of re-incorporation and the City of London Gas Act, Mr. Reeson was appointed Registrar; and in that capacity he had the supervision of the detail work in connection with all the Schemes of Amalgamation, the various issues of new capital, and the conversions of stocks and shares of the amalgamating Companies—his final appointment having been conferred upon him after the amalgamation of the London Gas Company with the Chartered Company in 1883. The following approximate figures will give some idea of the expansion of the Company during Mr. Reeson's connection with it: Originally, the amount of share capital was £900,000; there was no loan capital; and the number of shareholders was 1100. Prior to the conversion of the Company's stocks in 1899, the amount of share capital was £9,000,000, and of loan capital £2,500,000. At present, the former is £21,500,000, and the latter £4,000,000; while there are 17,000 shareholders and 3000 debenture-holders. We are pleased to learn that Mr. Reeson severs his connection

with the Company upon a retiring allowance; but, apart from this recognition of the long-continued faithful service he has rendered to the undertaking, we understand that, at the last meeting of the Directors, the Governor (Colonel Makins) made some appreciative remarks in regard thereto and to Mr. Reeson personally, which were ordered to be entered upon the minutes. We sincerely trust he may be spared for many years to enjoy his well-earned rest.

OBITUARY.

Mr. JOHN SCOTT NEILL, Manager of the Gas Company at Elie, Fifeshire, died there on Friday, at the age of thirty years.

MR. HENRY FEARON WILSON, youngest son of the late Mr. John Wilson, met with his death, on the 18th inst., under exceedingly sad circumstances. Feeling unwell on the previous Saturday night, he obtained medical advice; and the doctor ordered rest, and prescribed chloral to give relief for the insomnia from which deceased suffered. Failing to obtain the immediate rest which he so much needed, Mr. Wilson administered the drug himself on Sunday night, with the result that he took an overdose, which caused death on Monday morning. Mr. Wilson, who was only 24 years of age, was by profession a Gas and Water Engineer, having served his articles at the Carlisle Gas-Works.

NOTES.

An Architect and Surveyor Approves of Gas Water-Heaters.

In a paper on the subject of "Finishing a Dwelling-House," read by Mr. E. W. Davis, Surveyor, at the Discussion Section of the Architectural Association, the author said a good word for the much-maligned gas "geyser" as a means of obtaining warm baths in summer. He had no doubt a hot-water system is the best, but admitted that, with the great improvements in gas cooking apparatus (in small houses, at least), the gas-cooker more often than not does duty for the kitchener in summer. This is speaking of houses not large enough to have a special furnace for the hot water. If, then, a hot bath is wanted in the summer, the kitchener fire must be started for this purpose only, or a "geyser" installed. Mr. Davis's experience with these appliances has been entirely in their favour. He says he has had half-a-dozen fixed at one time or another, and every one has given great satisfaction to the users; even in some cases where there had been a strong prejudice against them, owing to the newspaper reports of deaths arising from their use—in every instance, so far as Mr. Davis could gather, an imperfect use. He has, however, never ventured to fix one without a vent-pipe, which he thinks need not be an eyesore. It can be of rectangular shape; but care should be taken that it is turned well up into the flue. Mr. Davis specially commends the later patterns of geysers, in which the gas and the water must be turned on together, thus removing a large element of danger. He asked for the experience of others on this matter, as the newspaper reports referred to frequently prevent the adoption of the gas water-heater, when it would really be a great convenience to the small householder.

Cleansing Power Gas from Dust.

It is understood that the most serious problem in regard to the utilization of blast-furnace gas directly in the cylinders of gas-engines lies in getting rid of the dust which such gas always contains, sometimes in very troublesome quantities. The apparatus used by the Cockerill Company, at Seraing, to effect this purpose was recently described and illustrated in the "Engineer." It consists mainly of a centrifugal fan, placed in the gas circuit, which draws the gas from the furnace pipes and delivers it, under a slightly increased pressure, to the engines. A water-pipe connection is made to each side of the fan, and the jet which enters is reduced to a finely-divided spray by impact upon the revolving blades of the fan. This spray mingles with the dust, increasing its density and mass, and causes it to be thrown violently against the outer casing of the fan, where it settles and runs downwards to a drainage outlet. A fan of 1·5 metres diameter, running at a speed of 900 revolutions per minute, can deal with about 200 cubic metres of gas in this time. This is equivalent to 7062 cubic feet of gas per minute, or 423,720 cubic feet per hour. This takes about 45-horse power; while the consumption of water necessarily varies a good deal, according to the condition of the gas. The minimum is not stated. Larger apparatus of the kind is being constructed, with fans 2 metres diameter, and capable of delivering ten times the quantity of gas above stated. This will take 130-horse power. In this way, a single fan is credited with reducing the dust contained in the gas from 3 grammes per cubic metre to 0·25 gramme. With two fans in series, the purification has been brought to 0·09 gramme per cubic metre; but a standard of 0·3 gramme per cubic metre is considered quite high enough for engines of the Cockerill-Delamare type. It is evident that several fans in series would be required to deal with a very dusty gas, such as that of furnaces using soft materials.

Hints on the Use of Portland Cement.

Mr. H. Howard Humphreys has discussed in the "Builder" the causes of expansion and contraction of portland cement concretes and mortars, which are so troublesome and disappointing when they occur in engineering structures. is admitted that alterations of volume of concrete or mortar after setting sometimes occur apparently capriciously; but the causes of the mischief may be classified under the two heads of: (1) Disruptive stresses due to internal movement in the cement; and (2) disintegrating atmospheric conditions. Heading No. 1 can be split up, and the responsibility for the trouble can be divided between the manufacturer and user thus: Causes of movement within the control of the manufacturer, improper proportioning of the raw materials, insufficient burning, excessive chemical impurity, presence of artificial adulterants, and bad milling. The user is responsible for employing new and unaërated cement, or too rich mixtures, more especially for rendering. With regard to the former class of defects, it is explained that manufacturers are exposed to the temptation to raise the tensile requirements for the week's test. This leads to over-liming, when the 28 days' test may show 30 per cent. less strength than the week's test. Insufficient burning is due to the temptation to economize over-much in coke. It is easy to detect, by the low specific gravity and brownish colour of the fresh cement. Excess of magnesia is dangerous, but does not occur in the cements made on the Thames and Medway. Sulphate of lime is a dangerous impurity. Bad milling is a mischievous fault. The old specification of 10 per cent. residue on a 2500 mesh is obsolete. No standard degree of fineness seems to be accepted; but it is stated that a sample recently tested by the author's firm showed a residue of only 3·2 per cent. on the 14,400 sieve. At least one large cement works in this country has under consideration the expediency of separating the coarser from the finer grains of cement, and regrinding the former. The user is counselled on no account to neglect the emptying-out and careful turning of his cement purchases before using. Cement used for rendering, with the object of making brickwork watertight, should always be mixed with an equal part of absolutely clean, sharp sand. Neat cement always cracks; and a further cause of dissatisfaction with its use is the inability of workmen to spread it fast enough, which constantly tempts the men to "knock it up." All cement work should be covered up in frosty weather, and kept damp in summer and carefully screened from sunshine. The latter is most important.

COMMUNICATED ARTICLE.

THE AUDITING OF GAS COMPANIES' ACCOUNTS.

A Reply to Some Criticisms.

By F. G. NEWTON.

I was about to reply to the letter from Mr. George Helps on the above subject, that appeared in the "JOURNAL" for Oct. 8, when the first article entitled "Auditing Gas-Works Accounts," by "A Shareholder," was published. It then appeared desirable to hear all that the latter gentleman had to say before further discussing the question; so I trust Mr. Helps will pardon my delay in answering him. The reproduction in the "JOURNAL" of the paper which I wrote for the "Accountants' Magazine" has certainly served its purpose, which was to draw attention to a matter that is very rarely so much as considered by directors and shareholders—namely, the real value of the average audit.

A good deal of paper and ink might, however, have been saved if "A Shareholder" had, before beginning to criticize my article, taken the trouble to read it carefully. Had he done so, he would scarcely have fallen into the material error of representing me as proposing that auditors should, in the performance of their duty, institute "an inquiry into every transaction, and the character of every employer." Ridicule of this imaginary proposal occupies so much of "A Shareholder's" articles, that one is led to wonder whether, if he had comprehended my actual suggestions, he would have ever given himself the trouble to write upon the subject. He speaks of "a full legal investigation of each and every transaction undertaken by the concern" as entailing, as it would, a great increase of expenditure and a serious hindrance to everyday working, without conferring compensating advantages. He describes as "an obviously absurd and ridiculous task" that of "an audit extended to strict legal evidence for and against every transaction entered upon the books." Indeed, he harps on this one string with the persistency of Counsel addressing a thick-headed jury—taking obvious pleasure in thrice slaying the slain.

And it is all absolutely irrelevant! If "A Shareholder" will be so good as to refer now—as he might have done some weeks since—to my original article (*ante*, p. 465), he will find, in the third and fourth paragraphs, an exposition of the policy which I suggested as calculated to make an audit efficient within the bounds of practicability. I asked: "Is there any third alternative to the two extremes indicated—namely, of examining every item in the books of a company, or of accepting without question the certificate of its officials for the accuracy of the books?" To this I answered that a third alternative "was to be found in the auditors of a company adopting the policy of first making themselves thoroughly acquainted with the whole of the system on which the accounts of the company are kept . . . . and then

making it their practice . . . . to check from time to time some of the entries in every book, tracing the entries through to the balance sheet. In other words, to audit samples; it being impossible to examine the bulk. . . . Such is the system that —granting the impracticability of the ideal—would be found, I believe, most efficient for the examination of the accounts of industrial concerns of magnitude, and which would enable the auditors to sign the balance-sheets without forfeiting their self-respect." Throughout my article, in fact (after, as will be seen by the foregoing, carefully excluding the idea of examining every item in the books of a company) I refer to examining "some" of these or comparing "some" of those, and to "occasionally testing" entries—the very essence of my proposal being summed up in the word "test." And then "A Shareholder" writes as if I had proposed "a full legal investigation of each and every transaction." The description "obviously absurd and ridiculous" may well be used to qualify such a blunder.

The criticisms of "A Shareholder" being so completely vitiated by this failure to comprehend what he is criticizing, it might almost appear unnecessary to deal further with them; but there are some points that, having been published, cannot be allowed to pass unchallenged. In the first place, "A Shareholder" denies the assertion that has been made that the general run of gas company audits are little better than farces; takes exception to such an assertion being made without "direct evidence;" sets aside such evidence as has been adduced that auditing generally is inefficient, because the "frauds" in question were "outside our own special industry;" and declares that, "judging by results, the present system of auditing gas accounts is at least fairly satisfactory."

Direct evidence that can be cited, since the Higgs case, there is perhaps none; but what does that prove? Not that auditing is efficient—direct evidence of that would be the discovery of fraud by the auditors, and I have yet to hear of that—but that in no case of defalcation or fraud on the part of a gas company's officials have the auditors been publicly blamed. No such cases of fraud have been discovered in regard to the affairs of a gas undertaking as led to the severe strictures upon auditors on record in regard to the Liberator group, the New Zealand Loan Agency, the Millwall Dock Company, National Bank of Wales, or Dumbell's Bank. But that does not, directly or indirectly, prove the efficiency of gas company auditing. For all we know, it may be (I do not suggest that it is) the consequence of the reverse. On the other hand, those best in a position to judge of the efficiency of such auditing could, if they would, confirm my opinion that in many cases the audit is first cousin to an idle farce. "A Shareholder" must, of course, retain his belief; for I cannot, for obvious reasons, do more than express my opinion. But if he will attend the meetings of half-a-dozen large companies, and make a practice of heckling the auditors upon the character and extent of their examination of the accounts, he may find his faith in the value of the certificate "examined and found correct" somewhat shaken. The objection that, because auditing has been found wanting in the case of building societies, banks, and a dock company, but not in our own special industry, therefore it is not fair to assume that anything is amiss with auditing methods in that case also, is about as sound as would be the policy of a man who, originally possessing ten horses and losing five of them for want of locks on the stable doors, neglected to put locks on the other five doors because the remaining horses had not been stolen.

Then "A Shareholder" falls foul of the assertion that auditors are appointed by shareholders to safeguard them against the possible fraud or dishonesty of the directors or officers of a company, and proceeds to give his idea of the relationship of auditor to shareholder. What that idea is, however, is not clear; for in one sentence he appears to see that the auditor is responsible for keeping the shareholders informed as to whether the accounts laid before them are accurate or not, while in the next he declares "that the shareholders are responsible for accurate accounts, and should not shelve this responsibility upon the auditor or anyone else. If an official appoints a deputy to act for him in his absence, that official is still held to retain responsibility, even for the acts of his deputy; and the shareholders, in appointing directors and auditors, cannot get rid of their responsibilities."

The confusion of thought here is appalling. It is the function of the auditor to inform the shareholders whether the accounts are correct; but if he fails in that duty, the shareholders are responsible! Of course, if the writer merely means that if, when an auditor declares the accounts to be inaccurate, the shareholders do not have them altered, then the auditors are absolved from responsibility, no one will contradict him. No one has ever suggested the contrary; nor has any body of shareholders ever attempted to put such responsibility upon the auditor. But what we are evidently intended to understand by the passage quoted above is that the writer contends that the auditor is the deputy of the shareholder, and that, therefore, if the former neglect his duty the latter is responsible. This absurd idea originates in a false analogy between an "official" appointing a deputy to act in his absence—that is, the agent of a master delegating his duty to a sub-agent—and assuming responsibility for the deputy's acts or omissions, and a body of shareholders (who are principals, not agents) appointing auditors to do certain work on their behalf. To whom, may I ask, does "A Shareholder" imagine that "the shareholders are responsible for accurate accounts?" To heaven? The shareholders may conduce to their own undoing by appointing inefficient auditors, but to say that they are responsible if the auditors they appoint neglect their duty, is absurd.

Really, one would not have thought it could have been necessary at this time of day to argue the question that auditors are appointed and paid by shareholders to protect them against the dishonesty of the directors or any other of the officers of the company. There is no necessity to express any opinion on the subject, for the principle has been most explicitly laid down over and over again. To take the most recent trial bearing upon the point—that of the Auditors of Dumbell's Bank. In charging the Jury, the Deemster remarked: "First of all, an auditor represented the shareholders, and was there to protect them. His business was to exercise an independent judgment. He was not to take the Directors' nor the Managers' view, but, if suspicious, must probe it. Auditors were not to be mere arithmeticians and calculators." Commenting upon this trial, and the sentences passed upon the Auditors, the "Accountant" for Dec. 1, 1900, said: "One of the good results of this trial will be that the minds of the public will be educated to the fact that the audit of a Company's accounts is a very much more serious matter than it has hitherto been considered. The graver responsibilities of auditors have, up to the present, been kept somewhat in the background, simply because such a case as this has not previously arisen. But the legal liability of auditors has been the same all the time."

Again, I may quote the declaration of a Past-President of the Society of Accountants and Auditors as to what are the responsibilities of auditors. Speaking at Glasgow on the 5th of September last, Mr. E. Carr said: "The professional auditor's position . . . is strictly a fiduciary one; his business being to safeguard the interests of each proprietor. . . . He should take nothing for granted, but should verify every item by the best means at his command. . . . With regard to cash received, the difficulty is to guard against embezzlement by employees; and I think an auditor must be considered to have performed this part of his duty if he has taken all proper precautions against dishonesty."

Nobody ever said that an auditor could "provide for the honesty" of the officers of a company; but it is his duty to take all reasonable steps possible to ascertain whether those officers are dealing honestly with the company. "A Shareholder" makes great play with the idea that the officials of a company are likely to be offended by an auditor taking steps that would point to a desire upon his part to check their honesty. (I may remark, by the way, that "A Shareholder" here again displays his ignorance of the true position of an auditor by speaking of "the directors . . . sending an auditor." Directors have no control over auditors; the latter not being servants of the directors, but agents of the shareholders appointed to inquire into the accuracy of the accounts presented by the directors.) Apparently every company should, in the opinion of "A Shareholder," be a mutual confidence society. To ask a collector to render a strict account of his cash, is, I suppose, an insult; to call upon a storekeeper to account for the stores entrusted to him, an expression of want of confidence. The cashier of a bank must not be asked to balance up his cash out of season; nor must the directors send round inspectors to the branches of the bank to examine the securities—that would be "to publicly advertise the fact that they do not trust their manager farther than they can see him." "A Shareholder" must be a very soft-hearted, innocent gentleman; but I should not choose him to run my business if those are his ideas of supervision. He says: "Officials cannot be made honest, or kept honest . . by risk of detection and punishment, or by cunning tricks and traps devised by auditors." Let me ask: If there were no risk of detection and punishment, would there be no more theft than there is now? You may not be able to change a man's character by instituting rigid checks upon his honesty; but you may materially influence his actions—as, indeed, with his happy knack of self-contradiction, "A Shareholder" admits further on: "Supervision of a proper kind . . . will greatly reduce the chances of fraud being practised." By removing temptation, you can save many a man from becoming the prey of his weaknesses. An auditor's duty is not to see that the officials are honest-minded—that is not possible; but that they are honest-handed. And the more honest the man, the more certainly will he welcome a searching audit. No one can then say "Who knows?"

What really is "A Shareholder's" conception of the purpose of an audit, the principles upon which it should be conducted, and the duty of an auditor? It is by no means easy to discover. He describes as absurd and ridiculous the plan proposed by me—or rather the plan he chooses to imagine that I proposed (a vastly different matter); wanders up and down some proposals that I really did make; repeats some of my suggestions as if they were his own; and then ends up by saying: "No reasonable being could attach more value to the auditor's signature than it purports to convey—namely, that the signatory has examined the books and accounts!" Did anyone ever see a more hopeless begging of the whole question, which is: What is and what should be meant by saying that an auditor is to "examine the books and accounts"? If by that is understood that the auditor is merely to examine the final books of the company with sundry other books and vouchers, for the accuracy of which he may rely implicitly upon the certificate of the officers of the company (whom he is appointed to check), then, I say, such an audit is a stupid farce, and worse; it misleads many people who think it means more. In that contention I am supported, as I will presently show, by the highest authority.

(*To be continued.*)

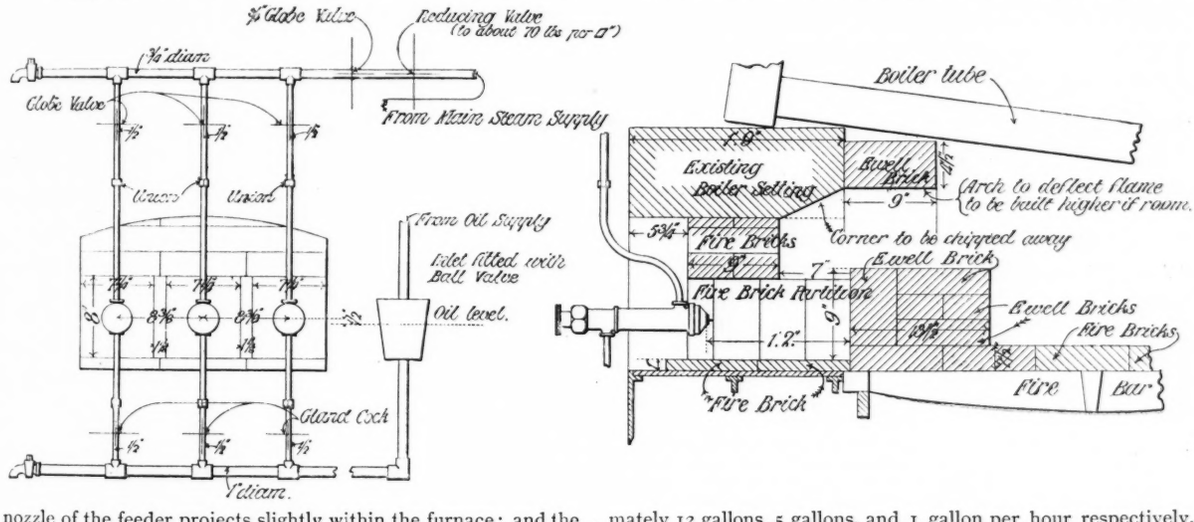
TECHNICAL RECORD.

WATER-GAS TAR FOR BOILER HEATING.

The problem of the utilization of carburetted water-gas tar, in an effectual and economical manner, has, there is abundant evidence, been successfully solved by the Hydroleum Company, Limited, of 323, High Holborn; and from what we see and hear, if their system of burning liquid fuel for the heating of boilers is largely adopted (and its merits give fair hope that it will be), it is not likely that water-gas tar will go begging for buyers in this country. The system, of course, is patented; and it comprises a feeder or burner and a combustion chamber of novel construction. The conveniences claimed in connection with the use of liquid as compared with solid fuel in boiler heating are too well known to gas engineers to need any specific setting forth here; and so we will not burden this article with them, but will confine our attention entirely to the question of water-gas tar burning, in connection with the Hydroleum Company's arrangement and method.

In regard to some of the older systems of burning tar, we have heard complaint made of the localized cutting heat of the large flames, of dripping tar and imperfect combustion, and consequently of smoke. But in these respects, and in economy and efficiency, we are satisfied, from experience in gas-works and elsewhere, that the system under notice will be found hard to beat, as the figures which we have at hand, and which we will give presently, satisfactorily prove. Referring first to the feeder or burner. Although this is the principal feature of the arrangement, it is really only a part—the construction of the combustion chamber being also an essential feature. The burner has two distinct passages through it—one being connected with the tar supply, and the other with the steam supply. The former is admitted near the rear end of the burner; and the steam-inlet is only a short distance from the nozzle. The construction of this feeder is a little difficult of description. But, generally, it may be stated to consist of two tubes so arranged that there is an annular space between them. Along the common axis of the two pipes is a plug with a gradual taper; and this, fitting into the nozzle of the interior tube, forms a finely adjustable needle valve, by means of which the supply of tar can be regulated to a nicety. Steam is admitted to the annular space formed by the two tubes; and this escapes at the nozzle in an annular jet. The tar passes into the inner tube; and as the needle valve occupies the central part of this tube, the tar current is also annular. Its outlet is slightly in advance of that from which the steam issues. This formation permits of a vacuum being formed in front of the tar orifice; and this vacuum produces a suck of tar from the reservoir. The tar is only at atmospheric pressure, and the reservoir is slightly lower than the outer nozzle of the feeder; but the steam is able to suck out the proper quantity of tar, no matter whether the feeder is going fast or slow. As soon, however, as it is put out of action, the level of the reservoir absolutely prevents any flow of tar into the furnace. It will be seen from this description that the tar and steam escape from the feeder in the form of a compound annulus or tube, and not as a solid jet. The shape of the orifice of the nozzle causes the steam-jet to expand as it escapes, and, again contracting, it assumes a bulbous form, and so there is not the abrupt spreading of the issuing vapours that is seen with certain other makes of burners or feeders. It is in large measure owing to this formation of the jet that the calorific value of the tar is so fully realized—in other words, that proper combustion is secured, that there is no waste, and that economy results to the user.

Now we come to the second part of the arrangement. The



nozzle of the feeder projects slightly within the furnace; and the intimate mixture of vapour is directed on to a dash-brick. In order to produce complete combustion, it is essential that the dash-brick should be of a certain size, and located in a certain position, and that between the feeder nozzle and the dash-brick there should be an enveloping constricted way or passage of refractory material, the area of which bears a definite proportion to the size of the feeder employed. By these means, every particle of vapour is kept together until it fires on the dash-brick, which, owing to the concentration of the vapours at that point, and its comparatively small area, rapidly becomes sufficiently heated to split up the vapour into its component gases, which, after leaving the brick, reunite, and give out heat in the combustion chamber.

The drawing which we reproduce shows the method of converting a Babcock and Wilcox boiler for the application of the system at a London Gas-Works, where it is also being fitted to Lancashire boilers. In taking the boiler in hand, the first thing that has to be done is to remove the furnace door, or, in the case of a Lancashire or Cornish boiler, the whole front, the fire-bars, and the bridge. In the case of a water-tube boiler, the fire-bars are left in, but are covered with a course of fire-bricks. In the case of a Lancashire or Cornish boiler, an annular brick lining is built to a depth of 2 feet from the front. At about 14 inches from the front, an arch is sprung from side to side at about the diameter of the flue; and this arch forms the dash-brick for the vapours to split against—the resulting flame passing over and under the arch. Between the arch and the furnace front are a number of restricted passages, into the front of each of which a burner projects. Compliance with the distance of 14 inches from the nozzle to the arch on which the vapours impinge and the other given measurements, is of great importance to the efficient working of the arrangement. The areas of the restricted passages, for example, are varied according to the quantity of tar it is required to burn. For one size of burner, they are 8 inches square, for the next 5 inches, and for the next 2½ inches; the consumptions of tar being approximately 12 gallons, 5 gallons, and 1 gallon per hour respectively. As a rule, we understand, three burners are fitted to each boiler, so that it is easy to turn one or two off, if necessity does not require the three simultaneously in operation.

The system has been in use at the Croydon Gas-Works with the water-gas tar; and Mr. Helps appears, from a conversation which we have had with him, to be highly satisfied with its operation and results. For the present, it has been discontinued; but the disposal of the tar in other directions is the reason for this. Of course, in a gas-works where a considerable quantity of breeze is made, if the water-gas tar can be vended profitably for use by other people, then it will not pay to entirely adopt the system; but gas engineers making water gas will not be slow to see that some advantage will accrue to them in fostering a system of heating boilers by water-gas tar which they can conscientiously recommend. However, at the Croydon Gas-Works, the interior arrangement of the system was not exactly carried out in the manner already described, although (speaking without trial) Mr. Helps thinks perhaps it will prove preferable to the plan he had in use. In his case, he had a 9-inch ring of Ewell fire-brick; and then at an interval a second ring of 9-inch fire-brick. In the front ring, there were three square passages into which the tar-burners projected; and in the second ring there were also three holes, but not opposite those in the front one. In this way, the jets of steam and tar had solid brickwork directly in front (at 14 inches distance) upon which to impinge and break up, and then the flame turned through the passages and caused a large volume of flame to spread round the boiler, instead of having, as with the old form of tar-burner, a single big cutting flame. A little distance from the boiler is an overhead tank containing the water-gas tar, which is carefully screened, the necessity for which Mr. Helps emphasizes. From this tank, when the system was in use, a pipe conveyed the tar to a smaller tank fixed at about the level of the tar-burners. Inside the latter tank is a ball-cock or float, which so regulated the height of the tar that the level was always slightly below the tar-burner outlet, so that, when the steam was

turned off and the burner not in use, there could be, as already explained, no overflow of tar into the furnace.

Now as to actual results obtained from the use of the system with water-gas tar. Comparative tests of the evaporative power (from and at 212° Fahr.) of coke and water-gas tar have been made in the furnace of a 50-horse power Hornsby water-tube boiler at the works of Messrs. Muirhead and Co., of Elmer's End, near Beckenham; and the Hydroleum Company are naturally making use of the excellent figures obtained. The first test was carried out with coke on May 15 last, and its duration was nine hours. The results were—

Mean temperature of feed water	60° Fahr.
Mean pressure on boiler	90 lbs.
Pounds of water evaporated	10,100
Pounds of coke consumed	1792
Pounds of water evaporated per pound of coke from and at 212° Fahr.	6·73
Price of coke per ton	£1 1s. 8d.

The test with water-gas tar was made on Aug. 14 last; and its duration was two hours. The results were—

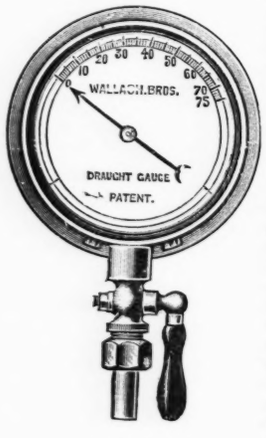
Mean temperature of feed water	70° Fahr.
Mean pressure on boiler	90 lbs.
Pounds of water evaporated	2400
Pounds of tar consumed	211
Pounds of water evaporated per pound of tar from and at 212° Fahr	13·47
Price of tar per ton	19s. 0½d.

In this test the tar was taken as received; no deduction being made for any water it contained.

To evaporate each pound of water with coke cost 0·0172d., and with water-gas tar 0·0075d.—showing a saving of 0·0097d. Messrs. Muirhead state that a week's saving in "fuel" by the adoption of the system was, comparing a week just previous to the change and a week in August, £2 18s. 7d. We have a notion that those gas engineers who are makers of coke and not of carburetted water gas will look somewhat critically at the figures given here, and perhaps ask for confirmatory tests in other quarters. However that may be, all we have done in this article is to put into a connected form information which has been supplied to us from different quarters. It is quite conceivable that intelligence of this kind—the successful supplanting of one common gas-works residual by another produced in comparatively few works—may not be acceptable to all readers. But it will be to some; and therefore we are only fulfilling a duty in chronicling it.

A DRAUGHT INDICATOR.

A good draught indicator is found to be to a large extent a guardian of economical working in certain of the operations of a gas-works; and one which stands in high esteem with some gas engineers is that known as the "Evertrusty," which is made by Messrs. Wallach Bros., of Gracechurch Street, E.C. Its name is an excellent one; for as a gauge indicating the slightest variations of draught passing through flues, retorts, chimneys, &c., its reliability is to be trusted. Variations of $\frac{1}{100}$th of an inch of water column are distinctly recorded on the dial, which has a magnified scale registering up to 1½ inches and 4 inches for Nos. 2 and 3 sizes respectively.



The construction is extremely simple; and therefore the working parts are not liable to get out of order. The pointer is connected with a vane perfectly balanced in its bearings, and most sensitive. The pointer is attached to a delicately pivoted spindle, which carries a regular counterbalanced plate fitted loosely to the chamber. Air is let through the damper on one side of this vane by a hole in the casing; while the other side is in connection with the flue by means of a tube, varying in length according to requirements. The draught of air through the instrument causes the vane to become inclined from its normal position; and the amount of draught is clearly and accurately indicated on the dial. The dampers can be regulated by means of the draught gauge, and should meteorological or other conditions affect the draught, it will be easily noticeable.

The gauge is connected with the flue by a ½-inch gas-pipe; and in the case of tubular boilers an elbow-piece is inserted in the brickwork above the tubes, or laterally, 6 to 10 in. above the register. By using an extra length of piping and elbow-piece, the indicator can, if desired, be fixed in front of the boiler. The indicator should point to zero when the damper is shut tight; if it does not, then there is some defect in the flue or chimney which requires rectifying. The great advantage of the indicator is that, by its means, a minimum draught pressure can be reached and maintained; and thus it renders considerable assistance in obtaining complete combustion and economical and correct firing.

SIR WILLIAM PREECE ON THE DISCOVERIES OF SCIENCE.

At the Opening Meeting of the 148th Session of the Society of Arts last Wednesday, Sir William Henry Preece, K.C.B., F.R.S., the Chairman of the Council, delivered his Inaugural Address, which was devoted to a review of the progress made during the past century in the application of the discoveries of science in furtherance of the objects in which the Society is interested, and to a glance into the future to see how far this is likely to be continued.

He began by pointing out that the greatest scientific discovery of the Seventeenth Century was the law of universal gravitation by Newton; that of the Eighteenth, the "law of Watt," which determined the latent heat of steam condensation at different temperatures and pressures; while those of the Nineteenth were: (1) The principle of evolution; (2) the atomic structure of matter; (3) the existence of the ether and the undulatory theory of light; (4) the principles of electro-magnetic induction and electrolysis; and (5) the principle of the conservation of energy. After briefly discussing the first four subjects, Sir William proceeded to deal with the last. In the course of his observations, he referred to the fog trouble, and expressed the opinion that our physical friends ought to commence the century with the firm determination to attack this enemy, and to let our grandchildren smile at the memory of the misery of their fog-folded grandfathers. Principal Oliver Lodge had cleared a glass globe full of fog by an electric discharge. Let him act on "the great globe itself," commencing in Birmingham. Sir William ventured to suggest that the first operation to ameliorate the evil in London was to enforce the Act compelling people to consume their own smoke and save them from consuming that of others. Passing on to allude to the evolution of the lighthouse and the lightship, he mentioned the name of the late Sir James Douglass among those who had assisted in this work; and he pointed out how the illuminants employed since the first pharos was erected at Alexandria 2000 years ago had been successively wood and coal fires, tallow and wax candles, and vegetable and organic oils, until at the present day heavy mineral oil, gas, and electricity were upon their trial. He went on to say that the Lenticular lanterns followed the invention of Fresnel; while the lamps were as numerous as the engineers who used them. The four-wick oil-lamp of Fresnel gave 230-candle power, while the six-wick lamp of Douglass gave 800 candles. Wigham's gas-lamp gave 2750 candles; and the light of the electric arc was reckoned in millions. Brilliant as the last was in clear weather, it did not seem to be more effective than oil in thick weather. Hence of the 1100 lights in Great Britain, only five were fitted electrically. Of the 80 light-ships, all were provided with two-wick oil-burners; but they flashed lights that were estimated as equivalent to 20,000 candles. Flashing lights were found far superior to fixed lights; for they were not mistaken for ships' lights—a fruitful source of error and disaster. Hence group-flashing was the order of the day. Sir William then proceeded to discuss some of the applications of energy.

Coming to the subject of the electric light, Sir William Preece referred at the outset to its phenomenal development since Edison and Swan brought out their glow lamp in 1881. The light had, he said, been taken up with avidity, and its use was increasing by leaps and bounds. The use of arc lamps for street illumination in the United Kingdom was not to be compared with the practice in the United States; but the difference was due to the universal presence of cheap gas here and of no gas or dear gas there. As a matter of fact, gas used with the Auer mantle could compete satisfactorily with electricity in this direction. It was in domestic life that the electric light had made such strides in the United Kingdom. It was in living-rooms where electricity was paramount. There the light was fine, the air not vitiated, health was unaffected, and comfort and cheapness secured. Lamps were being improved every day and made more efficient and therefore cheaper to work, because they consumed less current; and cheapness of supply was also developing by the increased use of electric energy for traction, motive, and heating purposes. The larger the plant in the generating station, and the greater the continuous number of hours the load was on, the cheaper was the cost of the generation. The potentiality of cheapness in our large municipalities was beyond the dreams of the economist. In Bradford the current cost only 1·22d. per Board of Trade unit, which was equivalent to gas at 7·32d. per 1000 cubic feet; and it was possible to contemplate the generation of electric energy at ¼d. per unit.

Speaking next on the use of electricity for heating purposes, Sir William pointed out that an electric current, which is one form of energy, does work upon a conductor which maintains it, and shakes up its molecules into another form of energy called "heat." This was, he said, the principles of the glow lamp; but the highest temperature was attained in the arc. Heat was obtained for useful purposes either by disruptive discharge in the arc or by metallic resistance in coils. The former was used principally for industrial purposes; the latter domestically, for warming rooms, beds, or water, and even for cooking. Radiators for use in cold rooms and in shops were excellent things, but were at present a little costly to maintain. He had contemplated using a coil inside a Tobin tube to heat the fresh air as it entered his

bedroom; but he was deterred by the present cost of the current. This would diminish, and then we should waste much less coal than we do now. There were many people who imagined that electrical energy was dear in England because of the absence of water power. There were no waterfalls in England to utilize; but in Switzerland, where there was plenty of water, it was used to a large extent. He was assured, however, that energy was not produced so cheaply there as we could produce it in our coalfields. It was a fallacy to suppose that a valley could be dammed up and a waterfall made and used for the cheap production of electrical energy. The capital spent in hydraulic works demanded an interest which, in every case he inquired into, exceeded the cost of the coal to produce the same energy. Even the waters of Niagara could not compete with oil and coal in Buffalo, 18 miles away. It had been pointed out time after time that we did not sufficiently utilize our coalfields. Power Bills had passed Parliament; but only one scheme was at work. Another was in progress on a very small scale; and the rest lay dormant. It was the fashion to attribute our backwardness to ignorance, to the absence of education, to conservatism, to prejudice, and to lack of enterprise. The cry was for adequate endowment and the encouragement of research; but no one had pointed out the true Homocea, which "touched the spot." It was the timid financier who was the true cause of all the trouble. It was he who had been frightened by the financial failures of the past, and whose confidence in electrical ventures has been shattered by the terrible infliction of the Limited Liability Act and its offspring—the company promoter. The panic which was the result of the excitement of 1881-2 had not yet been blown away.

With regard to the use of electrical energy for motive power, Sir William said that its cheap production meant economy wherever power was wanted. We had learnt that energy was something to be used, not wasted. Very few knew the waste of power in steam-pipes, shafting, belting, and ordinary mechanical appliances for the transmission of power. It was not too much to say that every colliery and every slate and stone quarry used twice as much coal as it ought. All our principal manufacturers were finding out the waste in their shops; and the rapidity with which electric motors were being introduced was astonishing. For some peculiar reason, the British manufacturer was very secretive; he did not want his competitor to know what he was doing. But those who had opportunities of knowing the facts could smile at the pessimistic strictures of the ignorant, and feel, like the great Roman, no despair about our own country. There was no such education as the loss of profits, and no such motive cause for economy as experiencing successful competition. The principles of Free Trade had encouraged competition, and we must cheerfully meet and fight the Frankenstein monster we had made, with our eyes very wide open.

Touching upon the subject of legislation, the Chairman remarked that its distinguishing feature during the latter part of the Nineteenth Century, had been the encouragement of municipal trading. The Limited Liability Act of 1862 led to a system of plunder far exceeding in intensity any crime ever invented or practised. The Act of 1882 checked this depredation on the purse of the confiding public in electrical undertakings; but its effect had been much weakened by the tendency of corporations to exceed their legitimate functions. The margin of municipal trading was well defined by confining it to those businesses that affect the whole community. When it trod on the corns of its own ratepayers, it was illegitimate. Roads, sewers, tramways, and illumination came within the category, and the exercise of powers in regard to these matters by local authorities had proved beneficial to the community they governed; for they had been able to establish their business with a smaller outlay of capital, and obtain their benefits for less annual expenditure. The profits had not gone to make fat dividends, but to ameliorate the rates. The chief argument brought against this system of municipal trading was that of checking all private enterprise. It certainly did this, whether inaugurated by the just or the unjust. But fortunately, and principally, it had checked the unjust, whose machinations in floating public companies so frequently formed such edifying reading in the reports of the proceedings of the Law Courts. The Act of 1870 certainly checked the construction of tramways; but the Electric Lighting Act of 1882, stopped gross financial abuse and wild speculation in the early days of electric light development. It was a beneficial Act. It placed the supply of electric energy on a legal, scientific, and solid basis; and it had not prevented the operations of legitimate private enterprise. London was a prominent example of this; while Liverpool, Sheffield, Leeds, Birmingham, and (now) Norwich and Dover, were cities whose Corporations had had to pay dearly for failing to grasp the value of the privilege which Parliament gave them, but which Manchester, Glasgow, Bristol, Hammersmith, Hampstead, and very many others, appreciated. Difficulties had arisen in connection with the operation of the Acts of 1882 and 1888—not so much from any antagonism between private and municipal enterprise, as from the existence of powerful vested interests like gas and water companies, and from the weakness of the district councils of small places, the members of which were not usually selected from the classes best educated and trained to govern, but from those who were too much controlled by self-interest, and whose foresight and business acumen were much restricted by the small sphere of their own operations. On the whole, the working of the Acts had been very beneficial to the public. Electric lighting among the poorer classes had developed in a way unknown in any other country. It had really become in many places, from its economy, the poor man's light. But, above all, it had stirred up the oil and gas interests. Artificial illumination had vastly improved; and the public were now supplied with lamps which compared with the farthing dip and snuffing operations of our youth, produced as great a contrast as London enveloped in black fog and London bathed in brilliant sunshine. We were advancing well. The trend was towards economy, efficiency, and comfort. The Twentieth Century would see great advances in much-needed street lighting. Gas and electricity would join hands. Cheaper generation of energy, more efficient lamps, and plenty of them, would render our evening peregrinations as pleasant and as safe as day locomotion, while our homes would be made healthier. The comfort and effectiveness of internal illumination would not be restricted; but all would be able to turn night into day without unnecessary heat or improper vitiation of the air.

In the closing portions of his address, Sir William dealt with the influence of the introduction of cheap telegraphy on the Press, reviewed the progress of traction, and touched upon other matters. He remarked that a wave of enlightenment in all that affected human happiness and welfare appeared to flow over the country in the past century, commencing with the accession of our late beloved Queen; and he said it was still flowing with undiminished amplitude and strength. This remark applied not only to engineering and industry, but to art, religion, morals, and politics, all of which were on the upward trend. Politics was still the least advanced of all our sciences, even of those that came within Huxley's definition of "systematized and organized common sense." It was the most popular, the most noisy, and the least efficient of them all. He concluded by expressing the hope that he had succeeded in showing that progress in all branches of life was due to certain motive causes working on the principle of evolution; that these causes were within the reach of our observation; and that they had only to be discovered in order that, by their encouragement, we might secure during the current century further advances in civilization and in knowledge.

RIVER POLLUTION.

[Abstracts of Papers, with the Discussions thereon, presented to the Conference on Water Supplies and River Pollution.]

Water Supply and River Pollution.

This paper (by Professor Henry Robinson, M.Inst.C.E.) was the first of three on the same subject, which were discussed together. The question dealt with by the authors was that of sewage disposal in relation to water supply. Professor Robinson's communication also contained a few remarks regarding the storage of flood waters. The writer reminded the members that at the Southampton Congress of the Sanitary Institute, in 1899, he called attention to the necessity for dealing with watersheds on comprehensive and well-considered lines, with a view to ensure the conservation of flood water, by which the increasing requirements of the large centres of population would be met, at the same time that the flow of the streams would be rendered more uniform, and injury by floods would be diminished. In storing flood water for domestic use, it was necessary that the storage reservoirs should be of sufficient capacity to enable the objectionable matters which came down with floods to be arrested as the water passed through the reservoir to the point of discharge.

It was not many years since engineers had to exclude to a great extent waters of the kind referred to from an impounding reservoir, on the ground that water once polluted remained always polluted. The author's opinion was that the suspended matters that were brought down in floods would be removed by natural deposition, and that undesirable organisms would be unlikely to continue to live when the conditions necessary for their existence had entirely disappeared in the presence of sedimentation, light, and other adverse influences. With regard to pathogenic bacteria, he contended that, when they passed into an uncongenial or an unnatural medium, their existence was attended with difficulties tending to their destruction rather than to their propagation. This view he acted upon in 1892, when he brought before Lord Balfour's Commission on London Water Supply proposals to construct economical reservoirs in natural valleys in the Thames basin, for the storage of flood water to meet the future requirements of the Metropolis. The change of views that had taken place in a few years in regard to this question might be illustrated by referring to the opinion that was expressed in the report of Lord Balfour's Commission, which was to the effect that flood water was "highly objectionable and undesirable;" whereas in the recent report of Lord Llandaff's Commission, it was stated that "no restriction need be placed on taking flood waters." This later opinion, Professor Robinson thought, would be acted upon as regards the Metropolis, and would also furnish a solution of the problem of providing for the requirements of other towns.

On the subject of river pollution, the author stated that, in an interim report recently issued by the Royal Commission on Sewage, the following remark occurred: "We are satisfied that the Rivers Pollution Prevention Act, 1876, has not resulted in the general purification of our rivers;" and the opinion was expressed that a new Department of the Local Government Board should be created, to be a supreme rivers authority. The pollution of rivers by trade refuse had to be considered from a standpoint

different to that from sewage outfalls. To use a river to get rid of foul matters which were the result of carrying on profitable manufacturing operations, could fairly be characterized as an abuse of the river where the polluting matter could be arrested, either at a trifling expense, or in many cases with actual profit.

Something had been done in the direction of preventing river pollution where special parliamentary powers had been granted to authorities (as to the Mersey and Irwell and the West Riding of Yorkshire Boards), and had been put into motion. He thought, however, that a certain amount of elasticity must be given in enforcing rules and standards of purity of effluents, and that cases must be carefully considered to avoid applying a rigid standard of purity under totally different circumstances. There were exceptional cases where the stringent enforcement of a high standard would involve an outlay on remedial works that might prevent the trader continuing the business upon which a large population might be dependent for a living. The author was engaged in such a case recently, where, while it was admitted that pollution took place (although some attempt had been made to abate it), it was shown that to be compelled to carry out the necessary works to purify the effluents would involve the closing of the establishment. The legal point was also raised that the pollution existed in 1876; and no order was made.

With reference to effluents from sewage outfalls, recent experience enabled many of the difficulties to be solved which engineers had to encounter, as the last few years had brought into practical shape remedies which were not previously available. The utilization of bacteria in anaërobic or aërobic chambers was the solution of many existing troubles. The preliminary breaking up of organic matter by anaërobes, enabled the resultant liquid to be utilized on land for agricultural purposes with greater advantage than where the sewage was applied in its crude state. Where sufficient land was not available, or where it was unsuitable for sewage disposal, then the further treatment of the liquid in aërobic beds enabled any required standard of effluent to be attained. Inasmuch as the purification of foul fluid by aërobic action was dependent on aëration, it would appear best to subject the fluid constantly to exposure to the air. This would be better effected when the liquid trickled over open surfaces of hard stone, clinker, or other material in the aërobic beds, than would be the case were the bed worked on the intermittent system—namely, first filled, then emptied, and then left to rest.

The interim report of the Royal Commission on Sewage might be regarded as removing a difficulty that engineers had had to meet in regard to one of the requirements of the Local Government Board, which had been that a definite area of land, in respect to population, should be obtained under all circumstances for the final treatment of effluents. It was pointed out in this report that peat and stiff clay lands were unsuitable for the purification of sewage. It was also stated that there were cases in which the Local Government Board would be justified in modifying, under proper safeguards, the present rule as regarded the application of sewage to land, and that no general rule as to what these safeguards should be would be laid down—it would probably always be necessary that each case should be considered on its own merits. The relaxation of the rule in regard to land was obviously right, as its enforcement often involved the anomaly of good, porous land being placed in the same category as stiff clay land.

The application of sewage to land must be governed by sanitary, agricultural, and economic considerations; but these were not always kept clearly in mind. The expression of opinion in the interim report, that each case should be considered on its merits, was a sensible and useful pronouncement, and would prove helpful in dealing with the varying conditions of cases in practice. It was seldom that two were alike. It was highly necessary to recognize this, so that intelligent inquiry might be made in each case, with a view to determining what standard should be required. If a drastic rule were made to apply under all circumstances, it would bear hardly on places where (say) the volume of fairly good effluent discharged was trifling compared to the flow of the river, or where the point of discharge of the effluent was where no possible objection could be raised or cause of nuisance arise, as in the case of a sea outfall with a set of the tide seaward at all times. Again, an effluent not chemically or bacterially perfect might, under certain conditions, be admitted to a stream of much greater volume, in which it would be exposed to oxygenation, the self-purifying action of plants, &c., by which it would in a short run be completely purified.

The Control of Weirs and Dams on Streams in Relation to River Pollution.

In a paper on this subject, Mr. A. G. Leigh drew attention to the necessity of remedial measures in regard to the existence of weirs and dams on the streams of congested manufacturing districts. They constituted formidable obstacles to the purification of rivers, and tended to nullify the good work which might otherwise accrue from the enforcement of the Rivers Pollution (Prevention) Act. It was self-evident that these weirs and dams constituted an indispensable factor in the consideration of the question of river purification, and that legislation was necessary making it compulsory for those who impounded the stream for purposes of water supply or water power to provide means of cleansing at such points by adding valves or penstocks to their weirs or dams. It was also evident that power of control over weirs and dams was desirable. The writer ventured to suggest that such powers would be most advantageously exercised by the rivers authority having jurisdiction over the watershed, and that they ought to comprise, *inter alia:* (1) The removal of disused and abandoned weirs and dams. (2) All plans of proposed schemes for flushing should be subject to the approval of the authority, which would ensure effective and properly constructed means of cleansing. (3) The limited control over arrangements for flushing. He used the word "limited" advisedly, having regard to prescriptive water rights. The time of opening such valves could be arranged to suit the convenience of the parties concerned. He would even go further and suggest an additional power—viz., (4) The removal of any obstruction to the flow of the stream, as falls of earth, undue accumulations of stone and other adventitious matter. The Rivers Pollution (Prevention) Act provided against offences causing obstruction to the due flow of the stream; and why should the power not be conferred for the removal of existing obstructions?

In the author's opinion, what was really required was a staff of river scavengers under the direction of the rivers authority. These men, divided in parties, with districts assigned to each, ought to commence at the source of a stream, working downwards—removing all unnatural obstructions and abandoned weirs and dams, levelling the bed as far as possible, and (according to pre-arrangement with the millowner or manufacturer) flushing and cleansing out the stream and sluices behind weirs and dams. If the flushing were continued frequently, as opportunity occurred, any collections of organic matter would be carried away before decomposition had time to set in; and in due course the manufacturer and millowner would be largely benefited in having a purer water supply and more wholesome sanitary surroundings. He was aware that the process would, for a short time, give rise to an almost intolerable nuisance; but better bear this, and improve matters, than tolerate and suffer an ever-increasing nuisance.

In the course of his paper, Mr. Leigh referred to the importance of paving the beds of streams through towns. Where the flow of a stream meandering through a thickly populated town was sluggish and impeded by all manner of obstacles, and where a number of the riparian population were indifferent to their neighbours' sanitary surroundings by using it as a means of conveying their refuse anywhere from under their own noses, it behoved the local authority to provide means of facilitating the flow of such stream by paving its bed, and thus ensuring the town being thoroughly rid of matter which might otherwise collect and develop into a hotbed of disease. It was, he said, very gratifying to know that many authorities were already alive to the importance of this question, and were taking practical steps to deal with it.

Prevention of Pollution within the Thames Watershed.

"No question that affects the health of the vast population of the Metropolis is of greater importance," remarked Mr. H. W. Russell, of the Berkshire County Council, in a paper bearing the above title, "than the prevention of pollution of the Thames and its tributaries; London being dependent for four-fifths of its water supply on the Rivers Thames and Lea." The Thames Conservancy Act of 1857, which incorporated the Thames Conservancy Board, conferred powers on the Board for preventing pollution of the main river below Staines; and these powers were from time to time enlarged and extended to the upper river and the tributaries, until, in 1878, the Conservators were empowered to prevent pollution of tributary streams at any point within 10 miles of the Thames above the western boundary of the Metropolis. These powers, although exercised to the full, were found to be far from effectual in preserving the purity of the river; and it was not until 1894 that Parliament, recognizing the necessity of ensuring a pure source of water supply for London, granted to the Conservators control of the entire watershed of the Thames above the western boundary of the Metropolis, and over the tributaries for a distance of 3 miles from the river below that boundary. Within those limits, no stream or watercourse was allowed to be polluted by the discharge of sewage or other offensive or injurious matter, under penalties ranging, according to circumstances, from £20 to £100. This vast area, which was over 5000 square miles in extent, reached from Banbury in the north to Haslemere in the south; and from Cirencester in the west to Leigh (Essex) in the east. It was supervised by a staff of eighteen inspectors and assistants. Samples of water were taken periodically from the River Thames at different points above the intakes of the Water Companies, and submitted to Professor Groves, F.R.S., for analysis; and this gentleman had reported that, owing to the action taken by the Conservators under their Act of 1894, the amount of organic impurity dissolved in the water immediately above the intakes was only about two-thirds of what it was before the passing of the Act.

The granting of these enormous powers to the Conservancy Board was not carried without strenuous opposition from the districts affected. The great controversy rested on the point where the pollution should be tested—whether at the actual source of pollution, or at the point where the tributary entered the stream. The Legislature eventually decided that the actual source of pollution should be traced and dealt with; and experience of the practical working of the Act had led the author to the conclusion that, on the whole, this was a wise decision. At the same time, it was one that might lead to unnecessary and irritating interference in many cases; and the authority entrusted with powers for preventing pollution should have a discretionary

power in putting into operation the penal clauses of the Act. There were cases where the pollution proceeded from farmyards, single cottages, or very small collections of houses, draining into ditches probably dry during a considerable portion of the year, or flowing into ponds which acted as settling-beds, and on leaving which the pollution was not to be detected—all this occurring at places perhaps 40, 50, or 60 miles distant from the river.

In carrying out successfully such a vast work, the co-operation of local authorities was most important; and in many cases this was very difficult to secure. Small and poor communities were called upon to carry out sanitary schemes of a character beyond their own modest requirements, in order to ensure the purity of the river, and were heavily taxed for this purpose because they happened to be situated within the drainage area of the river that supplied London with its first necessary of life. This undoubtedly constituted a grievance, and an obstacle to the effectual prosecution of the work. These considerations demanded the exercise of the greatest care and discretion in the administration of such far-reaching powers as the Conservancy had been entrusted with by Parliament; and a Committee of the Conservators was specially appointed for this purpose. The Committee had acted on a general principle not to unduly harass or press communities who showed a genuine desire to meet the requirements of the Act; and their labours had been lightened in no small degree by the readiness with which many of the local authorities and owners of private property had acquiesced in the diversion from the watercourses of offensive matter previously discharged into them. The absence of any powers to deal with manufacturing refuse put into a tributary beyond the present limit of jurisdiction, 3 miles from the main stream, had been a source of difficulty, and it would therefore seem to be advisable to further strengthen the powers of the authority in this regard.

The author's experience of the working of the Thames Conservancy Act of 1894 had led him to the general conclusion that, when entrusting an authority with powers to prevent river pollution, such authority should undoubtedly have control over the whole watershed—not over the main river only, but also over all its tributaries. Local sanitary authorities might be so constituted that, though imbued with the best intentions, they might find it almost impossible to bring pressure to bear upon local manufacturers, possibly large ratepayers, and possessing very great influence on their local representatives. It was also advisable that there should be no distinction between the powers relating to the main stream and its tributaries. What constituted an offence in the one case should apply equally to the other.

Small communities, when called upon to divert pollution from streams, often experienced much difficulty in deciding what measures to adopt to meet the requirements. They were frequently without any information as to the methods of treating sewage, and had not the means at their disposal of obtaining expert advice; their position being altogether different from that of large urban authorities who had their staff of professional advisers. The Thames Conservators had frequently been asked for suggestions and advice on the subject; but they had not felt able to undertake the responsibility. Mr. Russell suggested that some arrangements might be made by which one of the Government Departments could furnish suggestions and advice in this matter. He also thought some means should be found to relieve communities of at least a portion of the cost, where the works necessary were in excess of their own requirements, and were for the benefit of large centres of population.

Discussion.

Professor ROBINSON said the subject of his paper was, firstly, the storing of flood waters, which was a branch of the great question of water supply in regard to which he had of late years had much experience. The point he wished to emphasize was that they had enough rain in this country for ten times the present population. But this was of no use when the bulk of it passed down the rivers to the sea without being arrested for the purposes of the community. His own view was that the experience of the last few years, and the evidence that had been brought before the various Commissions, pointed conclusively to the certainty that in the near future water which they had hitherto considered as unfit to be pumped into the impounding reservoirs, would have to be so pumped. Vast quantities of water which at present ran to waste would be taken into the storage reservoirs. The advantage of this was obvious. In the first place, the engineer, in designing his works, would be relieved of the expense and difficulty which hitherto obtained of having to exclude from the streams or from the reservoirs any source which was even suspected of being tainted, on the principle that was maintained until quite lately that a river once polluted was always polluted. This contention, he ventured to say, was a fallacious one. A certain amount of pollution in a running stream disappeared in its course. But without going into this matter, he only wished to crystallize his views that the storage of flood waters would relieve many large towns of difficulties by which they were at present surrounded. He should have stopped there, had it not been for the fact that on the previous day Mr. Verney had referred at some length to the great question of the London Water Supply. Being in the chair on that occasion, he (Professor Robinson) had ruled that a subject of that kind could not be brought before this Conference; but inasmuch as Mr. Verney had laid it down that the future water supply for the Metropolis would be from Wales, and that the Thames was an unsuitable source of supply, he wished to put on record his dissent from this assertion, and his thorough conviction that the future water supply of London would be from the Thames, by means of the conservation of flood waters in the valley of that river. Taking a general view of flood waters, it was obvious to anybody that if they could impound the excess rainfall when it was not wanted, and was only doing harm, they would also be enabled to equalize the flow of a stream—which was an important matter in the case of a navigable river, or a river the amenities of which it was desired to preserve. If they could take water from streams only when the flow reached a certain definite amount—namely, in times of greatest rainfall—this would necessarily involve putting down plant which would enable them, within a limited period, to draw off all the water they required for storage purposes. If they could equalize matters in this way by storing flood water, the flow of the stream would be more uniform, and capital outlay would be reduced. So much for flood waters. Upon the question of the Thames, he was exceedingly pleased to know that they had in the papers of Mr. Russell some arguments confirmatory of his own. If they looked at Mr. Russell's papers, they would find in them a great amount of support—if that were required—of his (Professor Robinson's) view with regard to the Thames. As to river pollution, it was quite certain that the two questions went hand in hand. If they were going to take flood waters into the reservoirs, the purer the water was in the river the better it would be for the purpose of storage. This was one view. But in his paper he had dealt with the subject of river pollution from the two standpoints of manufacturers' refuse and the impure effluents from sewage outfalls. They had all to deal with the problem of how to arrest the flow of manufacturing refuse into the streams. In many cases they had been able to remove the polluting matter from the refuse by some simple means—often absolutely without cost to the people who fouled the river. Much of it admitted of being removed, with advantage, not only to the river, but to the manufacturers themselves. There were some cases, however, in which the imposition of any onerous conditions upon manufacturers might occasion stoppage of the works. In an instance with which he was acquainted, pollution was admitted; but the works necessary to remedy this state of affairs would have been so costly that the Company would have been compelled to cease operations altogether. This was stated in Court; and it was considered that, as the manufacturers had been doing all they could to abate the nuisance, it would not be right to force them to close their works. Therefore no order was granted. This was an extreme instance; and his object in referring to it was to suggest, or to urge, the necessity of having a considerable amount of elasticity as regarded the standard of purity—not to adopt a too hard-and-fast line—because the conditions varied everywhere. He was perfectly certain that it would be wiser, and more likely to be productive of good, if some elasticity was allowed; so that before an exact standard of purity was defined, an inquiry might be held, and the circumstances of the case gone into. This would remove a great hardship; and it would prevent either the evasion of the Act, or, if the Act was enforced, the shutting down of many manufacturing industries.

Mr. W. G. BAGNALL (Staffordshire County Council) remarked that, being Chairman of the Sanitary Committee and Rivers Pollution Committee of his county, he should like to say a few words on the latter subject. He agreed with Professor Robinson that recent experience enabled many of the difficulties which engineers had to encounter to be solved, as the last few years had brought into practical shape remedies which were not previously available. Staffordshire was a scattered county, with nearly a million inhabitants. Land was very often unobtainable, and much of it was of a clayey nature, and so useless for purification purposes. Most of the streams had their sources in the county; and the effluents from the works formed in many cases a greater volume than the original flow. The state of these streams could therefore easily be imagined. After the passing of the Rivers Pollution Act, many authorities made up their minds to do all they could to get out of their difficulties. Inquiries were held, and schemes were subsequently carried out. In the majority of cases, the method was precipitation and land filtration. When the works were finished, a sigh of relief went up from the authorities, who thought they had got out of one difficulty. They imagined that the Local Government Board would never pass a scheme unless they knew that it would be satisfactory. More than this, they could see a pure effluent going into the stream. When the County Council came into power, it was decided, in view of the fact that the streams were filthy, to take samples of the effluents from all the works, and have them analyzed every two months; and this had been carried out all along. Then came a very rude awakening. The County Council had to inform the various authorities that, although they were taking out the organic matter in suspension, the land was doing nothing towards taking out that in solution. A great difficulty then arose; and the County Medical Officer suggested that experiments should be made to see whether they could not deal with the sewage, after precipitation, on artificial filter-beds. This proved a success; and, even without precipitation, they had put the sewage on three beds—coarse and fine—and found that they got a perfectly good effluent. A most extraordinary fact was that they worked with these beds so long that the solid matter should have exceeded the total area of the three beds by something like five times; and yet it had all disappeared, the material in the beds being quite as clean as when it was first put in. One of the

authorities were at their wits' end. Their land filtration scheme was doing no good; and they were under a sequestration order. It was suggested that, after precipitation, they should put the sewage on soft coal slack. This had been done; and the result was absolutely satisfactory. They wanted to extend the system; but in this connection there was one matter which he must mention. Some years ago, the Local Government Board passed a scheme, and part of it was carried out. When the County Council came into power, they drew attention to the fact that the works were not completed. The authority applied for further money; and the Inspector, when he went down, asked where the land was. But there was no land in the neighbourhood; and it was pointed out to the Inspector that the sewage had been properly dealt with in experimental filters, and that the effluent was all that could be desired. It was therefore contended that, by enlarging these filters, the whole of the sewage could be efficiently treated. But the Local Government Board declined to sanction this; and the pollution had been going on just as before. There was no doubt, as Professor Robinson remarked, that the interim report of the Royal Commission on Sewage has altered the aspect of the whole question. He also agreed with the following statement in that gentleman's paper: "Inasmuch as the purification of foul fluid by aërobic action is dependent on aëration, it would appear best to subject the fluid constantly to exposure to the air. This would be better effected when the liquid trickles over open surfaces of hard stone, clinker, or other material in the aërobic beds, than would be the case were the bed worked on the intermittent system—namely, first filled, then emptied, and then left to rest." There might be some difficulty, perhaps, in distribution; but in the case of the authority he was talking about, they had perforated pipes, and this, although a rough method, was in every way satisfactory. What was wanted was that the Local Government Board should not shelve the whole of their responsibility. He took it for granted that they would in certain instances do away with land filtration; and he hoped that in future they would take each case on its own merits, for hardly any two were alike. He also trusted that the Inspectors would be properly posted and up to date, in order that they might reasonably listen to the schemes proposed to them. A short time ago, a town placed a scheme before the Local Government Board. The Medical Officer who was present at the inquiry said he did not think it would justify the cost; and the County Medical Officer was also against it. Notwithstanding this, the scheme was passed, and was a total failure. He thought the Board had been more reasonable during the present Parliament than during the last; and perhaps in time they might get their streams, if not as they once were, at all events in such a condition that they would not be a disgrace to the authorities.

Dr. READ (Medical Officer of Health for Staffordshire) said there was one matter to which he should like to draw attention, and that was as to the extent to which sewage disposal authorities would be expected to go in purifying their sewage from the point of view of the water supplying authority. He was very glad to hear Professor Robinson say that he was not in favour of a fixed standard of purity being rigidly enforced everywhere; he himself was equally opposed to it. But he thought they might draw some distinction between what ought to be done and what ought not to be done; and the question was where this line should be drawn. From a sewage disposal point of view, all that people hitherto thought necessary was to so alter the organic condition of sewage that the effluent should be sufficiently pure to sustain fish life. This could be done easily by modern methods; but it did not carry with it the removal of bacteria, including disease germs. The question therefore was: Were water supplying bodies going to ask sewage disposal authorities to carry the purification to an extent which would render the water safe for drinking? If so, it would involve an enormous outlay. If the Commission on Sewage Disposal—and they were taking a large amount of evidence on this particular point—were to suggest that local authorities should remove the bacteria from the effluents, it would be a very serious matter for them. Personally, he did not think they should be called upon to do this. But even if some had to do it, there was no reason why all should be obliged to. There must be some discrimination shown in regard to the standard which was to be laid down. In many cases in Staffordshire, the sewage was equal to two-thirds of the flow of the stream; and such water could never be made fit for drinking. Of course, there were instances in which it would be desirable to take the bacteria from the effluents; but was this duty to fall upon the sewage disposal authority or upon those responsible for the water supply? If the former, it might often be a great hardship. In any event, the water supplying body would have to filter the water; and this was the process by which the organisms could best be removed.

Mr. F. TOMLINSON (Northampton) wished to ask Professor Robinson for a little information with respect to his paper. In it he stated that the preliminary breaking up of organic matter by anaërobes enabled the resultant liquid to be utilized on land for agricultural purposes with greater advantage than where the sewage was applied in its crude state. The Corporation of Northampton had practically committed themselves to removing the present works and erecting fresh ones. But the best thing to do was what they were in trouble about. Their farm was efficient, and the effluent was satisfactory; consequently, all they wished to do was to comply with the Provisional Order—that was, to remove the suspended matter. It had been suggested that anaërobic action, in the form of a tank, would do this. The Committee had therefore decided to apply for powers to put a tank down; but a doubt had been raised as to whether the effect would not be to put the matter into solution, in which case the sewage would be very much more difficult to purify. It had been stated that this was the case in Staffordshire, and that they found their land (which was clayey) did not take out the matter in solution. If the tank working anaërobically would not make the sewage more difficult to treat than at present, that was what they wanted at Northampton; but if they could not rely on such a result, it would be a matter for very serious consideration. Their land was now working all right; and they were farming on a very extensive scale—their produce averaging about £5000 a year. His Committee, therefore, were most anxious not to do anything to make the treatment more difficult than it was at present; they merely wished to know whether the statement to which he had referred was made from actual results.

Dr. S. RIDEAL (London) remarked that he agreed with nearly everything that Dr. Read had said as to the relative positions of sewage disposal and water purification. This was very well brought out in Mr. Russell's paper, in which the author pointed out that small communities above the Water Companies' intakes had been put to very great expense in sewage disposal works. This had been caused by the last legislation of the Thames Conservancy; and he for one—as living above the Companies' intakes, and 10 miles away from the Thames—considered it was a very great burden upon him as a ratepayer to have to contribute to sewage purification works for bringing the River Thames up to a standard which was suitable for the supply of water for the Metropolis. He did hope that in any fresh legislation the two things would be kept quite distinct. Sewage disposal works should be works, not for the production of drinking water, but for turning out an effluent satisfactory for the river as a river. Mr. Russell in his paper drew attention to the fact that the Thames Conservancy legislation had resulted in producing a river which was suitable now for salmon; and this was a very legitimate object for sewage disposal works—to bring a stream into a condition to sustain fish life. But to go further and remove pathogenic organisms, though he was inclined to think that this was possible, at the same time it was not their function; and if they relied upon sewage disposal works for producing water fit for drinking purposes, they would be relieving the water companies and municipalities from work which it was their duty to perform. He felt certain that any attempts to protect gathering-grounds by this means would be beginning at the wrong end of the stick. What they really wanted to do was to purify the water just before the consumer drank it. The glass of boiled water which was cooling down, was the best form of drink for the community; and it was at that end of the whole system that the purification should take place.

Mr. A. BOWES (Newton-in-Makerfield) remarked that Professor Robinson spoke of the desirability of some elasticity in standards of purification. He (Mr. Bowes) had had twenty years' experience of sewage treatment in South Lancashire, and during the greater part of this time he was in the employ of a corporation who had, among their duties, the conservancy of a very large river watershed. He thought it was pretty obvious that, after twenty-five years of legislation, a very slight improvement had been effected. To his mind, this was due to the fact that the legislation was too drastic; it asked for too much. The Rivers Boards, of which he believed there were three—the Mersey and Irwell, the West Riding, and the Ribble—had fixed standards of pollution beyond which a town could not go; and these were too high for practical purposes of treating sewage. The outcome of it all was that they found towns of perhaps 15,000 or 20,000 inhabitants who would turn out an effluent which satisfied the standard; but where was there a town in the whole country of 150,000 or 200,000 inhabitants which had ever done it? The effect was trifling, particularly in the streams of which he had spoken. In Lancashire, they had streams which were inky black sewers; and the result arrived at, after all these years of legislation, was this: They might have at a certain point of a stream a small town spending money and turning out a good effluent, while just above it there might be a large town pouring out millions of gallons a day of an unsatisfactory effluent; so that all the money and efforts of the smaller town were wasted. Some elasticity should be accorded; and he desired to carry the idea a little further by suggesting, not an independent inquiry in each particular case—this would be costly, and would necessitate an immense staff of Local Government Board Inspectors—but that it might be possible to make a sliding-scale. That was to say, to have an effluent which was a certain percentage better than the stream into which it discharged—say, 10 per cent. better. This would work automatically. Every year an inspection could be made, and the towns be brought up to the standard. The effect would be that the towns on the upper part of the stream would be turning in something better than the stream, and it would gradually work itself downwards towards the end of the river. In this way, the quality of the water would year after year go on improving until they arrived at the best result obtainable. This would not be so good as the law required; but the law did not get what it required.

Mr. W. D. GIBBINS (Northampton), referring to Mr. Tomlinson's remarks, said that the Corporation of Northampton, in designing their new sewage works, intended, if possible, to put down a tank, either a covered or open one, and then to run the

effluent from the tank over the straining filter before it went to the farm. In this way they thought they would get a very good effluent to send on to the farm, and that they would be complying with the Provisional Order. The sewage farm at Northampton was doing its work well; and the effluents were satisfactory.

Lieut.-Col. JONES (Aldershot) desired to refer more particularly to Mr. Leigh's paper, which he thought should not be passed over lightly, because, to his mind, it was, as Dr. Rideal had remarked, beginning at the wrong end to endeavour to get a perfect effluent for drinking water. They had first of all to get rid of the effluent, and not allow it to stagnate in the river beds. To this end, he thought a great deal might be done by flushing down rivers. In the case of the river he had in mind, some of the authorities had for the last three or four years cleared out regularly the mud and obstructions; but there were one or two who did not do so. The Royal Commission, who had lately made an interim report, did not, as stated by Professor Robinson, recommend that there should be a new Department of the Local Government Board to control the rivers, but that there should be a separate Commission or Department. Personally, he did not think they could have a better model than the present Rivers Boards. But he considered that there was one useful and practical point in this interim report which was generally passed over; and it was that the Local Government Board had been justified before the Commission in a matter regarding which they had been subject to a great amount of abuse all over the country by the advocates of artificial systems. The Commission owed its origin to the agitation for the abolition of sewage farms in order to introduce artificial treatment. In their interim report, they said that, after three years of careful investigation, they could not condemn any land as not useful for sewage purification; but they regarded peat and very stiff clay as unsuitable. They recommended a very slight relaxation of the condition upon which the Local Government Board had always insisted, in regard to sufficient land being used in addition to any artificial systems. Chemical precipitation and all kinds of things had been tried for years and years; and lately Mr. Dibdin's discoveries and work had brought forward the natural treatment of sewage by land. Land was the only natural process of getting rid of sewage; it was Nature's true process.

Dr. RILEY (Great Yarmouth) said that, in his opinion, no sewage containing pathogenic organisms should be permitted to flow into a stream leading to a source of water supply. The tendency at the present time was to say that the whole of the trouble should be laid upon the water suppliers. Surely this was not beginning at the right end. If their filtration processes broke down, what barrier would there be between a water-borne disease and the community? It was imperative that Rural District Councils should set their houses in order. Sanitation in the country was the worst of the whole kingdom; that was why London was more healthy than a great many rural districts. The ideas of sanitation in the country were simply mediæval, and very often consisted in pouring the sewage into the nearest ditch, no matter where it went to. He should try to introduce a state of things by which sewage would be purified of all pathogenic germs before there was any possibility of its going into the water supply.

Mr. RUSSELL remarked that in the paper he had prepared on the pollution of the Thames he had been most anxious not to state his facts in such a manner as to give rise to any controversy. It was not a question, in writing his paper, as to whether the Thames was the best source of water supply. It was at the present time the source of supply; and for many years to come, whatever arrangements were made, it must continue to be so. Thus the enormous population of five or six million people were dependent upon the Thames for the greatest necessary of life. The Thames was such a big question that there could be no harm in bringing it forward; and the lessons and experience that had been derived from the treatment of this great subject were of much wider, and perhaps universal, application. He had been engaged on the Purification Committee of the Thames Conservancy and on the Port Sanitary Committee of the Corporation of the City of London ever since the Act of 1894 was passed. The knowledge that he had gained in carrying out the provisions of this Act had been very great. The Act placed the whole of the watershed of the river under the control of the Thames Conservancy. It was an enormous work; and it had been very successful. It was not only a question of the river itself, but every tributary, every ditch, every possible source of pollution in the whole of this vast watershed had been dealt with. The scheme had worked very well; but, of course, there had been some difficulties to contend with. It was the practical part of the business that he had thought it of great use to bring before the Conference, the members of which were all engaged with local authorities, and so would perhaps see the importance of it; and he hoped that some of the suggestions that had occurred to him would be found of value. In carrying out work of this kind, it was very important that they should have the co-operation of the local authority; but this was sometimes very difficult to secure. Of course, large urban communities recognized the importance to themselves of sanitation, and were prepared to carry out every suggestion; but when they were dealing with country districts sparsely populated, and had to call upon them to adopt sanitary measures that were vastly beyond their own requirements, it would be understood that great difficulties arose for such a body as the Thames Conservancy. The accident that these small communities were in the watershed of the Thames, and that any possible pollution from them might jeopardize the health of the Metropolis, compelled them to go to great expense. He thought that some contribution towards this outlay should be made by the persons who were benefited, or by the National Exchequer. The officials of the authorities with which many of those present were connected, were every day gaining valuable experience of different places and different methods of treatment. It seemed very hard that the Thames Conservancy should have to tell offending authorities that they must cease polluting the water, without giving them advice as to how they should do it. Of course, they were not the proper body to give this advice; but he thought that the enormous quantity of information that had been collected should be put in the hands of some responsible persons—a Government Department, for instance—who should be in a position to help those small communities, who frequently had adopted schemes which turned out to be useless, and so had to repeat a portion, at all events, of the expense. This was a trifling matter to big towns; but it was a serious one to the little places. He hoped this suggestion would meet with the approval of all present. The Conservancy had had a good deal of difficulty in dealing with manufacturing and trade refuse which ran into the tributaries, but which did not come within the term "injurious to public health." The powers of the Conservancy extended to the tributaries, but not to the extent of dealing with refuse of this character. The local sanitary authority had to look after that. For instance, they had a great many cases in which paper manufacturers had turned out refuse which was not exactly of a poisonous nature, but which destroyed the fish in several streams running into the Thames. They had tried to bring pressure upon the County Councils; and this was a matter that should be considered by those who were anxious to hand over further powers to such bodies. The County Councils were composed very largely of farmers and landowners; and as they felt very much any increase in taxation, they were not in any great hurry to use the powers they already possessed. An authority having the duty of preventing the pollution of a river should have the same powers over the whole of the watershed. What applied to the Thames should apply to the tributaries, and what applied to the tributaries should apply also to the main stream.

The Manufacture of Compressed Charcoal Briquettes.—A statement made by Gustaf v. Heidenstam concerning the manufacture of carbonized briquettes from Swedish saw-mill waste, has been published in the "Engineer." The results obtained are most interesting. In carbonizing wood, the prime condition of economical success is that the material should be as dry as possible. This is true of all carbonizing processes, and rests upon the truth that, if the material is wet, the water must be condensed (together with the products of distillation), and accompany the process of manufacture, and so be evaporated three times instead of once. By Mr. Heidenstam's process, the surplus sawdust is dried by the waste heat of the boiler-flues, and compressed by suitable machinery at this stage—that is, before carbonization. The briquettes are kept under hydraulic pressure during carbonization, which is the essence of the process. The treatment of the liquid residuals is as usual. The consumption of sawdust fuel for steam raising and effecting the carbonization of the briquettes, is 50 per cent. of the whole waste of the mills. The commercial results of the manufacture depend upon the value of the products, which is very variable for some of them. Stockholm tar is steady; and the price tends to rise in the market. The charcoal is the chief product, being 33 per cent. of the carbonized material. It only occupies one-third of the cubic volume of common charcoal, and is strong enough for use in blast-furnaces. The compressed briquettes have a calorific power of about 7800 calories.

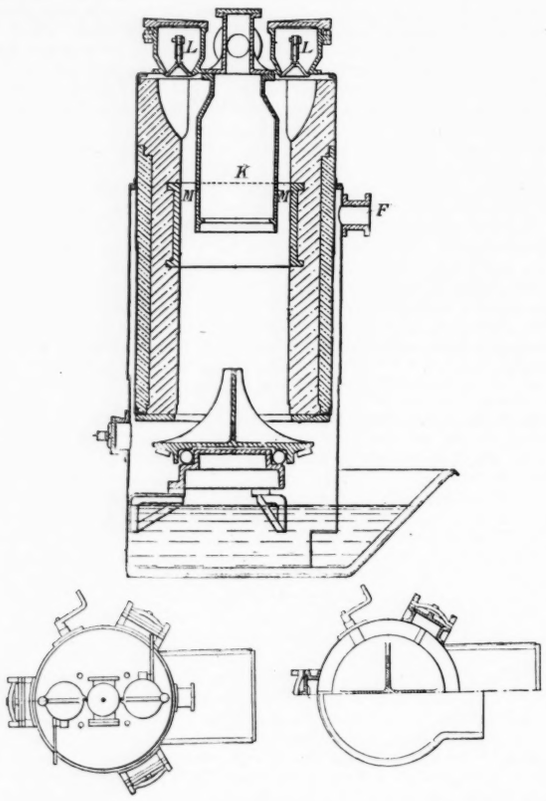
The Preservation of Leather Book-Binding.—In a previous "Note" printed in the current volume of the "JOURNAL" (see *ante*, p. 333), mention was made of the findings of the Society of Arts Committee on book-bindings, with special reference to the action of the products of combustion of gas upon leather bindings. It was admitted in this report that modern book-bindings in general do not last very well; but the hope was expressed that, as the causes of decay have now been made known, a more durable treatment of books may be expected. No public reference to this important subject has been made, till at the last meeting of the Nottingham Section of the Society of Chemical Industry, a paper by Dr. J. Gordon Parker and Dr. August Gausser on a tanning subject was read by Mr. Wood. There has been an impression that the use in tanning of extracts prepared with sodium bisulphite injures the leather, owing to sulphurous acid remaining in it, to be subsequently converted into sulphuric acid. The authors contended that this idea is erroneous. The reading of the paper brought up the old question as to the destruction of leather bindings by the products of combustion of coal gas, whereupon the reader referred to the transactions of the Society of Arts, remarking that the Committee had found that light itself is injurious, and that it is desirable to keep valuable books protected from the chemical rays by screening with glass of a yellowish tint. This prescription is additional to the information we have already published on the subject. It is a course not difficult to carry out. Unfortunately for the durability of modern bookbinding leathers, it is probable that acid is retained in the leather from the tanning process by a lime soap, or body of this nature. Eventually the acid will be released, with the familiar result.

REGISTER OF PATENTS.

Gas-Producers.—Crossley, W. J., of Openshaw, and Atkinson, J., of Marple. No. 19,377; Oct. 30, 1900.

This invention relates to producers for generating gas for power and heating purposes.

The producer (as shown) consists of a vertical cylindrical iron shell lined with fire-brick. At the bottom is a circular plate forming a grate, and placed a little below the brickwork lining—being also a little larger in diameter. The fuel rests on the grate, and air for combustion obtains access to it all round. The grate is made to revolve, in a horizontal plane, and either slowly and continuously, by power, or intermittently by hand, so as to cause the ashes to fall out. The lower portion of the producer-shell is surrounded by an outer cylindrical shell enclosing a narrow air-space, through which the air for combustion enters by the inlet F, and picks up heat from the producer-shell. The lower part of the outer shell extends below the producer-grate into a water-lute, which prevents the escape of air, but allows the ashes to be extracted from below the water-level.



In the centre of the top of the producer, the gas outlet-pipe is fixed. Pendent from this pipe (inside the producer, central with it, and hanging down some distance) is an extension K, the level of the bottom of which defines the active depth of the fuel on the grate, as it prevents any material combustion taking place above. Also on the top are fixed feeding hoppers L, which drop the fuel into the space M between the outside of the internal pipe and the lining of the producer, and in which space it may be to some considerable extent heated, and have its more volatile gases driven off. These gases having to pass the lower edge of the internal pipe K, are made more or less permanent by coming into contact with hot fuel; also tarry matter is thus more or less converted into valuable permanent gases.

It will be observed, say the patentees, that the air supporting combustion enters all round the lower portion of the fuel resting on the revolving grate, and has to pass inwards to the mouth of the pipe K. It thus has every inducement to flow uniformly through the fuel. The revolving grate also largely prevents any tendency to the formation of holes or cavities in the fuel "so commonly the cause of trouble in many types of gas-producers." By this means, also, a uniform depth of active fuel is maintained.

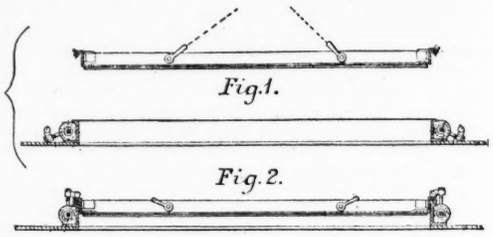
Purifiers for Gas.—Clapham, T. S., of Keighley. No. 20,484; Nov. 14, 1900.

This invention refers to the construction of the moveable covers of purifiers, so that "when placed in position perfectly gas-tight joints are formed, while their removal and readjustment may be more easily effected."

Fig. 1 is a sectional elevation of the covering of a purifier tank, showing the lid raised from it. Fig. 2 is a similar view, but showing the cover fixed in position. Fig. 3 is a plan of the lid and the upper part of the purifier. Fig. 4 is an enlarged elevation of the edges of the lid and the parts of the purifier in connection with which it is to fit, as well as the means whereby the one is forced and held in contact with the other. Fig. 5 is a side view of fig. 4.

A is the upper wall of the purifier, and B a flange on it, surrounding the opening in it to receive the cover or lid. The jointing surfaces of the covers have dove-tailed holding bars to receive strips of india-rubber or other elastic substance C of suitable cross-section, to fit tightly into the grooves in the holding bars, as well as to be of an appropriate shape for fitting against the upper surfaces of the flange B, against which they are forced in order to form a gas-tight joint.

In order to force or press the parts firmly together, a series of eccentrics D are mounted upon shafts E arranged to carry flanged bushes F F^1, so that, although the shafts are square in cross section, they freely revolve as the bushes take into circular openings made in



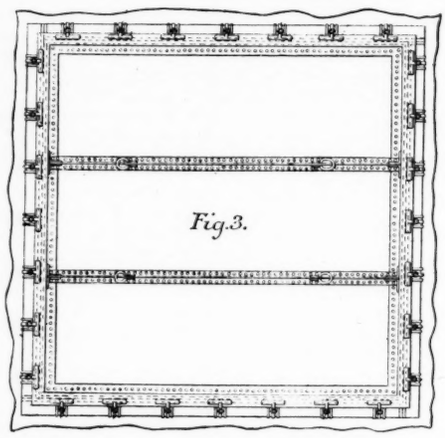


Fig.4.

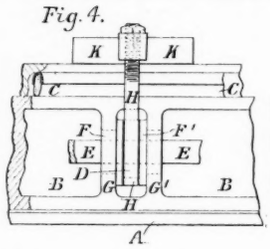
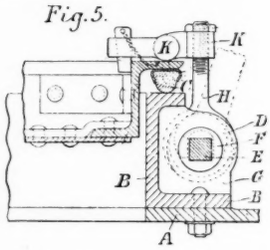


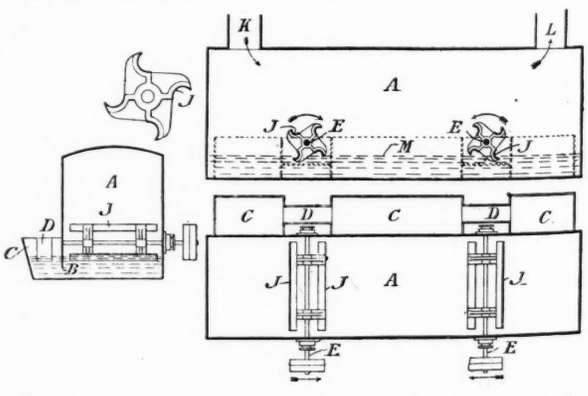
Fig.5.



the projecting ribs G G^1 of the flange B. The eccentrics are kept in their proper positions laterally by being mounted between the flanged bushes operating within the ribs, as are also the straps or connecting rods H taking over the eccentrics. The extending ends of these straps have a screw-thread formed on them to receive the hooks or holding arms K, which may thus be adjusted upon them, and there be further secured by nuts so as to firmly force the purifier lid into position by the turning of the shafts E by means of keys or handle levers.

Washers for Producer and Other Gases.—Humfrey, C., of Hartford, Cheshire. No. 22,644; Dec. 12, 1900.

These washers consist of "revolving beaters having scoops throwing up the washing liquor in such manner as to strike the liquid thrown up by the other set of beaters, and thus very intimately commingling the liquor with the gases passing through the upper part of the chamber."



The illustration shows a plan and longitudinal and transverse sections of the washer; also an enlarged view of one of the revolving beaters, showing the scoops.

Outside the washer proper A, there are continuations C; a part of the wall of the main chamber being cut away at B, and the bottom

extended. This portion of the tank C is open to the atmosphere, and through it dirt accumulating in the tank is raked out. D are smaller open troughs connecting the parts C, and yet leaving space for the bearings of the dashers. The shafts E are driven in opposite directions by fast-and-loose pulleys; and on the shafts are two or more spiders carrying curved plates J. These plates point in opposite directions in the two sets of dashers. K L are the inlet and outlet for the gas. M is the average water-line.

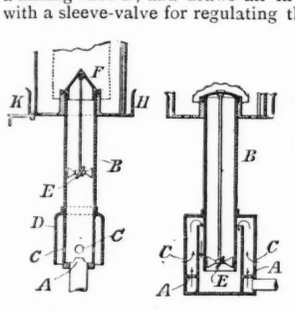
As the gases pass down the inlet K, the shafts E revolve, and the beaters carry up the water and drive it with great force towards the centre—filling the entire area of the tank above the water-line near the centre with spray; "the water from the one beater dashing against the water from the other, causing the masses of water raised to break up into very fine particles."

The action of the beaters has a strong tendency to drive the water that remains in the tank towards the ends of it. This water gets into the outside extension C, passes through the smaller troughs D to the central projection C, and thus again enters the space between the beaters. The result is that "the level of the water is not perceptibly raised at any part, and there is a perfect water-seal at B."

Incandescent Gas-Burners.—The Portable Gas Fountain Syndicate, Limited; a communication from J. Thovert, of Lyons, France. No. 23,605; Dec. 24, 1900.

Two forms are shown of the burner constructed according to this patent.

In the first (left-hand) form, the gas issues at A in the lower part of a mixing tube B, and draws air in through lateral holes C provided with a sleeve-valve for regulating the amount so admitted. The air-holes may also be shrouded by an annular bell-tube D, fitted on the exterior of the mixing-tube, and projecting down over the holes, but at some distance outside of them, so as to shield them against local currents. In order more effectually to mix the gas and air, a disc E, with helically inclined blades, is placed in the mixing-tube. At the top of the mixing-tube is a cone F, of wire gauze or perforated refractory material (steatite), through which the mixture of air and gas issues to the mantle.



In order to promote the supply of gas and air by the aid of the chimney draught, the gallery H has holes through it only large enough to admit the air necessary to supply the external periphery of the flame; while for the purpose of lighting the flame, the gallery is made with an opening through it sufficient to admit a torch, but provided with a shutter K, which is closed while the burner is in action.

According to the modification shown, the gas may be supplied to an annular chamber, from which it issues at A in jets, ascending an annular passage above, and drawing in air by lateral holes C. The current of gas and air then descends an inner annular passage to the bottom of the mixing-tube B, in which it ascends; being caused to weep round by a disc E with inclined blades placed in the tube.

Self-Igniting Incandescent Gas-Lights.—Rosenberg, A., of Berlin. No. 23,701; Dec. 28, 1900.

The patentee notices the fact that hitherto it has been very troublesome to prepare mantles impregnated with platinum salts for the purpose of self-ignition, whereby the impregnation remains on a certain limited place only. When impregnating mantles (in an unburnt-off state, as they come in commerce) on some places with platinum salts, it will be noticed that the salts soon spread more or less uniformly upon some other places of the mantles—thereby depriving them of their lighting power.

His proposal to remedy this evil consists in not using any hydrous solution of the platinum salts, but an organic solution of an organic platinum compound in fat or etheric oils, in a similar form as that well known in the ceramic industry for the preparation of brilliant gold or brilliant platinum. Not only platinum compounds can be used for the purpose, but also correspondingly prepared compounds of other metals of the platinum group.

The process is carried out in such a manner that the mantle to be prepared is first steeped in the impregnating fluid, and then the place to be made self-ignitible is covered with, or dipped in, the oily solution. In consequence of the hydroscopicity of the fluid salts, the mantle has, in a dry state, *per se*, a certain amount of moisture, which acts repulsively to such an extent against the oily liquor that the platinum solution or the like only remains upon the place it was spread over, and does not spread further upon the mantle.

Machine for Making Incandescent Gas-Mantles.—Bonnet, J., and Muller, J., L., of Paris. No. 83; Jan. 1, 1901.

This invention has for its object to mechanically effect the following operations: (1) The firing of mantles previously prepared and steeped in a solution of the oxides of rare metals (hitherto effected by hand) with the object of burning the textile material covered with a layer of the oxide. (2) The calcination of the skeleton or frame which remains after the firing of the mantle. (3) The steeping of the mantle, thus calcined, in a collodion bath or other substance, for the purpose of preserving it.

A very interesting account of the various operations involved is given in a lengthy specification—extending to more than 20 pages, and illustrated by 13 sheets of drawings—which there is no room in our columns to summarize.

Mechanical Gas-Washers.—Creeke, R. W. B., of Leven, N.B. No. 5948; March 21, 1901.

This invention, relating to mechanical scrubbers (more particularly, revolving brush scrubbers), has for its object "to carry out the process more efficiently than at present obtains, and with relatively less waste of space for the necessary machinery." The arrangement was described and illustrated in the paper contributed by the patentee to the last meeting of the North British Association of Gas Managers—see "JOURNAL" for Aug. 6, p. 336.

APPLICATIONS FOR LETTERS PATENT.

22,737.—RETTICH, A., "Atmospheric gas-burners." A communication from V. A. Rettich. Nov. 11.

22,751.—EWART, J. W., "Generating mineral oil gas." Nov. 11.

22,766.—PAUL, F. jun., and GUNDLACK, A. F., "Generation of gas." Nov. 11.

22,786.—IRVING, D., and GIBBONS, W. P., & G. B. A., "Regenerative furnaces." Nov. 12.

22,799.—HUNT, H., "Gas-taps." Nov. 12.

22,804.—CHILDS, J. G., "Elevators and conveyors." Nov. 12.

22,848.—GIBBONS, W. P. & G. B. A., SMITH, W., and GAY, R., "Gas-retorts." Nov. 12.

22,862.—BARRETT, M. E. B., "Gas-stoves." Nov. 12.

22,891.—DRAKE, J. A., "Regenerative furnaces." Nov. 13.

22,931.—SIMON-CARVES BYE-PRODUCT COKE-OVEN CONSTRUCTION AND WORKING COMPANY, LTD., "Coke-ovens." A communication from Societé Anonyme de Carbonisation. Nov. 13.

23,030.—STOCKALL, J. J., jun., "Automatically turning gas or water on or off, and the like." Nov. 14.

23,056.—FABRY, R., and LINARD, F., "Coke-ovens." Nov. 14.

23,093.—BAMFORTH, T., and BRANSTON, F. R. E., "Condensing gas-stoves." Nov. 15.

23,151.—NUTTING, J., "Gas-stoves." Nov. 15.

23,206.—THOMPSON, W. P., "Incandescent burners." A communication from Compagnie Générale d'Incandescence par le Pétrole et l'Alcool. Nov. 16.

23,212.—BROUWER, J. DE, "Charging retorts." Nov. 16.

Swansea Water-Works Dispute.—We learn from the "Cambrian" that the Cray Water-Works dispute may now be considered at an end. The late Contractors (Messrs. Paterson and Co.), after being bought out, claimed a certain railway siding connecting the works with the Neath and Brecon Railway, and applied for an injunction restraining the Corporation from using the same. At a special meeting of the Swansea Corporation last Tuesday, the Town Clerk (Mr. John Thomas) announced that a Judge in Chambers had declined to grant the injunction. Messrs. Paterson have therefore withdrawn their action.

Sales of Shares.—On Wednesday last Mr. James Catling sold £3000 of new maximum 10 per cent. stock in the Ely Gas Company. The stock was offered in lots of £50 each, and realized from £59 to £63 per lot. On the same day, Mr. Frank Amos offered £1500 of new "A" stock and £1000 of new "B" stock in the Canterbury Gas and Water Company. The stock was put up in lots of £10; the "A" stock realizing from £20 to £21 per lot, and the "B" stock from £19 15s. to £20 5s. per lot. Mr. W. Fiddian recently sold 400 4 per cent. preference shares of £10 each in the Stourbridge Water-Works Company, at prices ranging from £11 14s. to £12 4s. each.

The Proposed Purchase of Gas-Works at Abercarn.—A meeting of ratepayers has just been held to consider whether the Council should proceed with a Bill in the next session of Parliament for the compulsory purchase of the Abercarn Gas and Water Company's undertakings, and for power to supply gas and water. The Chairman (Alderman P. W. Raffan, J.P.) moved that the Council be authorized to promote the Bill. An amendment was proposed by Mr. W. Thomas, that a Committee be appointed to further inquire into the best means of lighting the district. Mr. Lewis Thomas, in supporting the amendment, strongly advocated the use of electricity. The resolution was carried; but a poll of the ratepayers was demanded.

Gas Poisoning Fatalities.—A domestic servant named Eliza Usher has been the victim of a most unfortunate occurrence at Jarrow. The gaslight in her bedroom was generally turned low at night; and it is supposed that when the pressure in the mains was reduced at midnight the light went out, and when the pressure was restored the gas filled the room. The girl was found dead in bed. The accident may serve to draw attention to the danger of leaving gas-jets turned very low on retiring to rest. Mary Anne Pendlebury, of Stanhope Road, Regent's Park, was recently found dead in bed by her maid. At the inquest, it was stated that she had a lighted gas-stove on a table near her bed, and that the door and windows were closed. Dr. Thomas Sayers deposed that death was due to syncope from heart disease and chronic gastritis, accelerated by the fumes of carbonic oxide that escaped from the stove. The Jury returned a verdict of "Death from misadventure."

Gas Inquiry at Chesterfield.—A Local Government Board inquiry was held at Chesterfield on Friday, by Mr. R. H. Bicknell, M.Inst.C.E., relative to an application by the Gas and Water Board for sanction to borrow £10,000 for gas extension purposes. The Clerk to the Board (Mr. John Middleton) stated that the borrowing powers for gas purposes had been extended, by a Provisional Order granted in 1900, from £30,000 to £80,000. The Local Government Board had sanctioned loans to the amount of £35,204, of which sum, however, no more than £29,204 had actually been borrowed. In July, 1899, sanction was obtained to borrow £10,000 as floating capital for gas extension purposes. This sum was intended to carry the Board on till March 31, 1900; but as the whole of it had not then been exhausted, they went on, and at the end of the next year—March 31 last—they had an overdraft account of £229. The new loan for which they were now making application was for the provision of meters, fittings, mains, &c., for the extension of the lighting area to include Hasland. The demand for gas continued to increase; and from March last to the present time, the consumption was equal to an increase of 11·2 per cent. on the previous year. Replying to the Inspector, Mr. Middleton said a new gasholder, erected at a cost of £6000, had just been completed; and the present storage capacity was equal to the requirements of the near future. The proposed loan would, it was estimated, carry the Board on for another three years. The inquiry then closed.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Economical Advantages of Inclined Retort-Settings.

SIR,—Mr. Herring, in his letter of the 14th inst., is hardly correct in claiming for inclined retorts the monopoly—whatever this may imply—of continuous hoppers and avoidance of continuously running coal machinery. In connection with the stoking machinery at these works, there are both continuous and what Mr. Herring would call "sectional," but which may also be termed "intermittent" hoppers; and in each case the coal is distributed from centrally situated elevators by conveyors which extend to almost the whole length of the retort-house.

During a great part of the year, the coaling is done within the limits of an ordinary working day. In winter, when a maximum requirement of about 800 tons a day is reached, it takes longer; but it seldom or never extends throughout the 24 hours.

With regard to the cost of machine working, it would be interesting to know from Mr. Tysoe whether his men work eight or twelve hour shifts.

CHAS. HUNT.

Windsor Street Works, Birmingham, Nov. 22, 1901.

Inclined v. Horizontal Retorts.

SIR,—Mr. Herring expresses a wish for more information *re* inclines and horizontals worked by machinery. Below, I give what it is costing me by the latter.

The cost for carbonizing the coal pure and simple (that is, for charging and drawing the retorts) is as follows:—

For wages only when working—

18 stokers at 35s. 8d. weekly.	12 beds carbonizing	997 tons	weekly	9½d.	per ton.
	11 ,, ,,	831 ,,	,,	10½d.	,,
	10 ,, ,,	755 ,,	,,	11¼d.	,,
	9 ,, ,,	680 ,,	,,	12¼d.	,,
12 stokers.	8 ,, ,,	604 ,,	,,	9¼d.	,,

To get at the total retort-house carbonizing cost, must be added the firemen, coal-elevating men, and men looking after the De Brouwer conveyors. This is as follows for wages only:—

3 firemen, 3 engine and coal men, 3 coke men, £15 5s. 6d. weekly.	12 beds	an additional	4d.	per ton to be added.
	11 ,,	,,	4¼d.	,, ,,
	10 ,,	,,	4¾d.	,, ,,
	9 ,,	,,	5¼d.	,, ,,
	8 ,,	,,	6d.	,, ,,

From these figures it will be seen that when the twelve beds are at work in the winter months, we carbonize at 9¼d. per ton; when retorts are being dropped, the price per ton goes up till the eighth bed is reached, when the price falls to 9¼d. per ton again; but this variation of price would equally apply to inclines if the whole lot could not be kept on the year round.

The figures I have given refer to our No. 2 retort-house, containing twelve beds of eight retorts, 22 in. by 16 in. by 20 ft. long, charged every six hours with 6¾ cwt. charges. The machines are West's compressed air. The coke is taken out by the De Brouwer conveyor.

HY. SIMMONDS.

Bury, Lancs., Nov. 23, 1901.

Naphthalene.

SIR,—The only excuse I can offer to the profession, for so young a member as myself venturing to make a few observations on such an engrossing subject as naphthalene, is that it appears to have an extremely important bearing upon the future of gas supply. Apart from the expense of clearing stopped service-pipes, &c., a most serious loss of prestige is incurred through this intolerable nuisance.

It is, however, a remark in Mr. Carpenter's interesting paper read at the last meeting of the Southern District Association of Gas Engineers and Managers, that has prompted me to address you. In speaking of the proper working temperature of the condenser, Mr. Carpenter confirms an opinion which I have for some time ventured to entertain. It is generally known that gas at a certain temperature cannot contain more than a certain quantity of naphthalene, some of which is deposited if the temperature be lowered. It would therefore appear that, in order to prevent these deposits, the process of manufacture should have regard to this fact. But has any attempt been made to deal with the trouble *systematically* on these lines?

Thorough and ample condensation is, in all probability, the means of preventing these annoying deposits; area being an important factor. Moreover, may it not be advisable to "hold" the gas at certain temperatures, so that the tarry vapours may fully perform their important part?

Briefly stated, the method appears to be: 1. Ascertain systematically the temperature of the gas in the distributing mains in various parts of the district. 2. Thoroughly and slowly cool the gas to the lowest temperature it is likely to be subjected to in the distributing area.

Systematic condensation on these lines should, surely, effect the desired object. But what alterations to existing plant may be needed, and at what cost, it is hardly necessary to discuss.

It is only recently that opportunities have occurred here for commencing to deal with the matter in the manner suggested; but we have for several weeks past taken daily readings of thermometers placed in suitable positions in the district supplied from the Windsor Street works, as a guidance for future operations.

P. C. HOLMES HUNT.

Adderley Street Gas-Works, Birmingham, Nov. 23, 1901.

SIR,—May I suggest to your readers (or those of them who are troubled with naphthalene), that it may be deposited from the gas as the result of low temperature at a special period of the manufacture. It is to be hoped that the Committee who are about to investigate this important subject will turn their special attention to the tower scrubbers now so universally adopted. Although I do not belong to the ranks of the gas profession, I have had many years' experience in gas matters in a small works, where a large increase of consumption has (especially of late) been experienced. In years past, we had some trouble from naphthalene, but recently none from the condensers. The gas passes to a Livesey washer of ample size, and then through a Kirkham washer-scrubber. The make and illuminating power are generally very good; and there are few complaints of the gas.

A GAS AMATEUR.

Nov. 23, 1900.

Loss of Illuminating Power of Gas with a New Holder.

SIR,—In the discussion on Mr. Murray's paper at the last meeting of the Southern District Association, several speakers alluded to the loss of illuminating power which is generally experienced when freshly-filled tanks are used for the first time; the loss being attributed to absorption of the illuminating constituents of the gas by the water.

Fresh water has, no doubt, great absorbent properties. It also carries with it a quantity of air. Is it not possible that a portion at any rate of the loss of illuminating power may be due to diffusion? I am inclined to think that the air held in suspension by the water is gradually displaced by the gas; thus reducing the illuminating power of the contents of the holder.

Some time ago, you mentioned in the "JOURNAL" the case of a long syphon of iron pipes, screwed together in the most careful manner, failing, owing to the introduction of air by some peculiar means; while a lead pipe with wiped joints proved a success. The conclusion arrived at was that air was admitted at the joints of the iron pipe. If this conclusion be correct, it may to some extent lead to an explanation of the loss of illuminating power, if gas is stored in a holder for any length of time, even after the water in the tank has been in use for years. The length of joints in the sheeting of a holder is considerable; and it is not uncommon to find perceptible leakages from them.

In the case of the syphon above referred to, no leakage at all was perceptible; and still air accumulated to such an extent as to render the syphon useless. A gasholder, therefore, appears to be much more liable to a similar process. With a syphon, of course, there is a certain amount of "draw" when at work; and I only mentioned the case you reported to emphasize the extreme difficulty of making absolutely air-tight joints.

Exactly how air could insidiously introduce itself into the holder against the pressure of the gas, I am not able to clearly explain except by the term diffusion. But every gas engineer has had experience of water finding its way into a gas-main that is at all leaky (which acts very much as a surface drain); and it is at least possible that a somewhat similar action may be going on unperceived with gasholders.

THOS. A. GUYATT.

Ely, Nov. 23, 1901.

Coal-Stack Fires.

SIR,—For many years the spontaneous firing of coal at these works has been a source of trouble and annoyance. For replies to inquiries upon the subject, I am indebted to many engineers for valuable information.

Last year, on account of the restricted storage area, the material had to be stacked to a height of 26 feet, which was the height I have stacked coal for about a dozen years; and I was assured by some that it was this great height which caused the heating. The coal storage areas have now been extended so that this height is not necessary.

From the Board of Trade report, referred to in the "JOURNAL" for Oct. 29, I found that the Australian experience showed the maximum desirable height to be 17 feet—that anything above this was unsafe. This year, to be on the safe side, therefore the coal was stacked here to only 15 feet. In a portion of one stack, only 12 feet was reached; and singularly enough the coal at this point fired, and had to be used up as speedily as possible.

I had determined, in the event of a rise in temperature, to adopt a recommendation to saturate the affected part with water; but on account of the dry season then prevailing, the water for manufacturing purposes, &c., in this town was prohibited, while for house use it was only turned on for four hours daily. This experiment I was unable to try; and so it is gratifying to read of Mr. Tysoe's satisfactory trial of the water treatment, as recorded in your issue of the 5th inst.

I am fully satisfied that the water cure is the right one. When one reflects that damp coal has been so abused, and that care has been taken to only stack dry coal, what a change of opinion is apparent; while it now appears that the difficulty is possibly through the coal not being damp enough.

All my correspondents confirmed my own tests as to the worthlessness of all systems of ventilation.

I ought to add that the heated coal this year was in a covered shed, while that stacked in the open has not fired.

Of course, that the nature of the coal is directly responsible for the heating, one cannot but be convinced.

Only those who have had the experience of coal-stacks heating and firing, understand fully the anxiety such a catastrophe involves.

The members of the Institution of Gas Engineers who participated in the visit on the Continent during Mr. Corbet Woodall's memorable presidency a few years since, will remember that at one works visited the coal was noticed smoking and firing, as it was emptied from the railway waggons—a brilliant prospect for the engineer concerned!

EDWARD A. HARMAN.

Huddersfield, Nov. 22, 1901.

The Municipalization of Water Supplies.

SIR,—I notice in the "JOURNAL" for Oct. 29 (p. 1104), among other statements made by Mr. W. J. Burgess, the Chairman of the Liverpool Water Committee, that "apart from the villages and country places possessing no organized supply, one-half the existing undertakings were in the hands of joint-stock companies, conducted by private enterprise for private profit." This information is derived from the returns

compiled by Mr. G. L. Gomme for the London County Council in 1898. The figures are as follows :—

Of the 64 county boroughs in England and Wales, the water supply is under public control in all but 19.

Of the 241 corporations of boroughs in England and Wales, other than county boroughs, 139 have an established system of water supply under their control.

Of the 766 urban district councils, 356 have an established system of water supply under their control. [I find in a Government return published in 1879 there were 944 urban districts!]

Possibly some of your correspondents can supply reliable information on this particular point which would be valuable to many readers of the "JOURNAL." Statements of this description made at a conference convened for the express purpose of disseminating facts up to date concerning water supply, should be carefully prepared. The "Water-Works Directory" is far too incomplete to decide a question of this kind; and we are anxious to see the statistics now being prepared by the British Association of Water-Works Engineers published in the "JOURNAL." The above statistics are given by Mr. Burgess to show the rapid march of municipalization; but the length of time it has taken to bring it about is not stated. The figures may be correct as far as they go; but it does not represent the case in its true light, nor is the information up to date. The 356 established systems of water supply require inspection, confirmation, and a true description; but if a larger proportion of water companies' property had been municipalized in the time, it would not show the necessity for the change or the superiority of municipal management.

What methods does Mr. Burgess adopt other than those binding by law on the London Water Companies, whose intakes are under public control? Is his method of filtration superior to that of the London Companies? Are there as many samples of water analyzed by different experts as by the Government Analyst, published in the public Press, and then distributed in pamphlet form for the benefit of the whole of the consumers? Mr. Burgess is the Chairman or Managing-Director of the Committee of the Liverpool Corporation Water-Works; but he gives no information as to the prevention of pollution of the Liverpool supply at the catchment areas, wells (as "wells are open to suspicion"), in transit, in the reservoirs, or during its distribution. The precautionary methods probably may not be even so much up to date as in London, Bristol, Portsmouth, Bournemouth, Devonport, and many other towns. When all water companies are condemned as "sinners" for not distributing potable water, not having so far adopted protective measures so as to prevent pollution equal to Liverpool, we have a right to request Mr. Burgess to supply the necessary information that will enable companies to protect, filter, and distribute as fine a sample of water as the Liverpool Water Committee may be doing.

It will be news to many readers of the "JOURNAL" to discover that Mr. Burgess is conducting the Liverpool Water-Works in a superior manner to the other towns not yet brought under the yoke of a water committee. We may be told that we are a "standing menace;" but the Chairman should produce the death-rates of these towns, including his own city, and publish the analysis of the Liverpool water, that we may compare it with the water consumed in the "menacing towns" not yet municipalized. I cannot understand why a water committee should be possessed of a larger share of expert knowledge on these matters than a board of directors; but if they are able to vend a superior article at a cheaper rate, then the conference was the proper place to teach the "sinners."

I find Mr. Gomme has placed Liverpool in the list of works being run at a loss; the deficit being met out of the borough rates, or out of a special water-rate.

Nov. 14, 1901. COMPANY.

PARLIAMENTARY INTELLIGENCE.

NOTICES GIVEN FOR BILLS (SESSION 1902) RELATING TO GAS SUPPLY.

Barking Gas.—The Barking Gas Company purpose applying for additional capital and borrowing powers. It is proposed to alter the provisions of their existing Act in respect of price, dividends, and reserve and insurance funds; and others will be made with regard to the pressure, testing, and supply of gas, rates and charges, the laying of pipes in streets not dedicated to the public use, and into consumers' premises, as well as other matters. Authority will be sought for the acquisition of more land.

Belfast Corporation.—A General Purposes Bill of which notice has been given by the Belfast Corporation will contain clauses referring to their gas and electric light undertakings. It is proposed that authority should be conferred on the Corporation to provide motors, machinery, and other appliances for utilizing electrical energy for power, heating, and other purposes, and to let them on hire. They also wish to have the regulation of wires, pipes, apparatus, and fittings in houses, buildings, or premises supplied, or to be supplied, by them with electrical energy or gas, and the right to prescribe the materials and fittings to be used, and the position in which the pipes, wires, &c., should be placed, before they are required to supply electrical energy or gas, as the case may be. They will ask to be authorized to discontinue the supply where the fittings and apparatus are not in accordance with their requirements; and also to make bye-laws with reference to any such matters, with a view to securing the safety of the inhabitants and the better prevention of fire. Provision will be made that the Corporation are not to be under any obligation to supply electrical energy, otherwise than by agreement, to persons requiring to use such supply on any premises in which any other machinery or means of supply exist. Additional money powers will be required.

Birmingham Corporation (General Powers).—Among other things, the Birmingham Corporation will seek authority to acquire a piece of land situated in the parish of Erdington, in the county of Warwick, for the purpose of manufacturing gas and residual products thereon. They will also ask to be empowered to prescribe the size and material of pipes and fittings on the consumers' premises, to make better provision for the lighting of private streets, to lay down pipes in streets not dedicated to the public, and to amend section 15 of the Gas-Works Clauses Act, 1871, in regard to the connection or disconnection of meters without notice. With respect to their electric light undertaking, they wish to be authorized to make bye-laws for securing the safety of, and the prevention of fires in, premises supplied or about to be supplied with electricity, to supply electrical energy in bulk to outside authorities, and to accept a transfer of an electric lighting undertaking in an adjoining district and supply energy within such district. Further borrowing powers will be sought.

Bournemouth Gas and Water.—The Bournemouth Gas and Water Company intend to apply for authority to acquire the undertaking of the Town and County of Poole Gas and Coke Company, Limited, maintain and enlarge the works, and extend their limits of supply. Special permission will be sought to enable the Company to create and issue capital otherwise than by auction or tender. The Bill to be promoted will contain provisions in reference to the sale of gas in bulk within or beyond the limits, and the supply of stoves, fittings, &c. The Poole Company will be wound up and dissolved.

Bradford Corporation.—In a General Purposes Bill to be promoted by the Bradford Corporation, provision will be made for the acquisition by agreement of the undertakings of the Clayton, Allerton, and Thornton, Airedale (Idle), and Eccleshill and Bolton Gas Companies, or one or more of them, and the extension of the Corporation's limits of supply so as to include the parishes now served by those Companies. It will be specified that the charge for gas in the added area shall be the same as within the limits fixed by the Corporation's Acts of 1871 and 1873, and others amending them. Authority will also be sought for the construction of additional works in connection with their water undertaking, consisting of three service reservoirs, five lines of pipes, and a road affording access to one of the reservoirs. The Corporation will ask for an enlargement of their borrowing powers.

Bradford-on-Avon Gas.—The Bradford-on-Avon Gas Company, who are now working under a Deed of Settlement, desire to be dissolved and re-incorporated, with the usual powers conferred upon gas companies. The existing capital is to be regulated, and more will be required.

Broadstairs Gas.—Power will be sought by the Broadstairs Gas Company to acquire certain lands by compulsion or agreement, construct and maintain gas-works, and erect dwellings for their officers and servants. The Bill to be promoted will contain provisions in regard to the payment of half-yearly dividends, the discontinuance of the supply of gas, and the regulation of meters and fittings, &c. The Company desire to be authorized, among other things, to make and lay down subways, tramways, pipes, wires, and other apparatus for carrying or conveying coal, coke, water, oil, or any substance used or produced in the process of gas manufacture. Additional capital will be needed.

Bromley Gas.—The Bromley Gas Consumers' Company will apply for authority to consolidate or convert their share capital, and raise more money. In the Bill to be promoted for these and other purposes, provision will be made for the issue of shares or stock to consumers or employees, the prepayment of gas-rates, the supply of fittings, &c., and the sale of gas in bulk. The Company will also seek permission to alter their sliding scale, form a renewal fund, and apply for power to supply electricity.

Caterham and District Gas.—The Caterham and District Gas Company wish to be dissolved and reincorporated with additional powers and increased capital, and they will apply for the necessary authority for carrying their intention into effect, as well as for power to supply gas and residual products in Caterham and the neighbourhood, maintain and construct works, deal in fittings, &c. Provision will be made for the sale of gas in bulk or otherwise for light, heat, cooking, incandescent lighting, or motive power.

Chard Gas.—Application will be made by the Chard Gas and Coke Company, Limited, to be dissolved and reincorporated with power to supply gas in the parish and borough of Chard, and the parish of Combe St. Nicholas. Provision will be made for extending the works and increasing the capital. The usual authority to manufacture and supply meters, fittings, &c., and inspect them, will be sought; and the Company will ask to be empowered to apply for permission to produce and supply electrical energy.

Chigwell, Loughton, and Woodford Gas.—Application will be made by the Chigwell, Loughton, and Woodford Gas Company for authority to purchase land and construct additional works, lay down gas, oil, and other pipes and telephone wires, and extend their limits of supply so as to include the parish of Lambourne, or part thereof. It is proposed to alter the illuminating power and the price of gas, and make provision for the formation of a renewal fund. The present capital is to be consolidated, and more will be applied for.

City of London (Streets).—The proposals of the Corporation of London in regard to the opening of streets in the City are noticed on p. 1393.

Commercial Gas.—The notice given by the Commercial Gas Company of their intended application to Parliament for further powers was dealt with in the "JOURNAL" last week (p. 1323).

Deal and Walmer Gas.—Authority will be sought by the Deal and Walmer Gas Company for the purchase of additional lands for the erection of works. The Bill to be promoted will contain provisions as to the supply and measurement of gas, and the payment therefor; the provision of stoves and fittings, &c.; and the conversion of the capital, of which more will be required.

Fareham Gas.—The Fareham Gas Company intend to apply for authority to purchase certain lands compulsorily and by agreement, and construct works and store gas thereon. The present price and dividend are to be abolished, and a standard price with sliding-scale instituted. Powers will be sought with respect to the quality and testing of gas, the supply of stoves and fittings, &c., and the sale of gas in bulk. More capital will be required.

Halifax Corporation.—In a Bill to be promoted by the Halifax Corporation, clauses will be inserted for the amendment of the Halifax

Improvement Act, 1853, and the Halifax Corporation Water-Works and Improvement Act, 1868, in regard to the discharge of compensation water from the Widdop and Warley Moor reservoirs, so that it shall be delivered in a regular instead of an intermittent flow. Power will be required to alter, amend, or repeal section 22 of the Halifax Water and Gas Extension Act, 1876, and to empower the Corporation to limit the supply of water for domestic purposes inside and outside the borough in times of drought or other exceptional circumstances; and to make further provisions with respect to bye-laws for securing the purity of water, additional charges for baths of large capacity, and the provision of public drinking fountains. It is proposed to acquire certain lands for the protection of their reservoirs and works from pollution; and authority will be sought to create a reserve fund for the gas, electric lighting, and tramways undertakings. Additional borrowing powers will be applied for.

Leamington Corporation.—A Bill of which notice has been given by the Leamington Corporation will contain a clause to render null and void the notice given by them to the Leamington Priors Gas Company, in pursuance of their Act of 1896, requiring the Company to sell their undertaking; to repeal the provisions of that Act relating to such sale, or in any way to the supply of gas; and to confirm any contract or agreement which may be entered into between them and the Company with reference to these matters.

Leyland and Farington Gas.—Application will be made by the Leyland and Farington Gas Company for authority to consolidate and convert the existing capital, and raise more money.

Longwood Gas.—Application will be made by the Longwood Gas Company for authority to purchase additional lands and the undertaking of the Colne Vale Gas, Drysaltery, and Manufacturing Company, Limited. Power will be sought to continue and construct gas works, supply gas, stoves, fittings, and other appliances, and levy rates and charges. The present capital is to be consolidated, and more will be applied for. Provision will be made in regard to price and dividend, and the formation of reserve and other funds.

Omagh Gas.—The Omagh Urban District Council have notified their intention of applying for authority to purchase, by compulsion or agreement, the undertaking of the Omagh Gas Company, and supply gas in the district of Omagh, and in so much of the parishes of Drumragh and Cappagh, in the rural district of Omagh, as lies within 2½ miles from the centre of the existing works. The Bill to be promoted will contain provisions for maintaining and improving the existing works, supplying meters, fittings, &c., levying rates and charges, and making contracts for the sale of gas beyond the limits. Borrowing powers will be required.

Reading Gas.—It is the intention of the Reading Gas Company to apply for authority to consolidate and convert the existing capital, divide the new stock among the shareholders, and raise more money. The Bill to be promoted will contain provisions in regard to the supply of gas in the ordinary way and in bulk, the sale and hire of engines, meters, and stoves, and the holding of yearly meetings. It is proposed to increase the amount of the reserve fund, and to establish a pension, superannuation, or sick fund for persons in the service of the Company.

Rickmansworth Gas.—The Rickmansworth Gas Company intend to apply to be dissolved and re-incorporated with additional powers for the maintenance of the present and the construction of other works, and the supply of gas for illuminating, heating, and power purposes. They also wish to be authorized to acquire and use patent rights and licences for the manufacture of gas for illumination or power, and to raise further capital.

Shepton Mallet Gas.—The Shepton Mallet Gas and Coke Company desire to be dissolved and re-incorporated with increased capital and additional powers for the supply of gas in Shepton Mallet and the neighbourhood. Authority will be sought to maintain the existing works and construct others, purchase lands, provide meters and fittings, and generally carry on the business of a gas company.

South Metropolitan Gas.—The scope of the Bill to be promoted by the South Metropolitan Gas Company next session is indicated on p. 1393.

Swindon United Gas.—Application will be made for authority to enable the New Swindon Gas Company to purchase the undertaking of the Swindon Gas and Coke Company, Limited, and carry it on. The Bill to be promoted will contain clauses defining the limits of supply, which will include Wroughton, and giving the Company power to sell gas in bulk, inspect fittings, form reserve and other funds, &c. Additional capital will be required.

Tipton Urban District Council.—The Tipton Urban District Council will seek power to erect gas-works on lands belonging to them, make bye-laws and regulations with respect to electrical fittings, supply such fittings, and sell electrical energy in bulk for working tramways.

Wadhurst Gas.—Application will be made for the incorporation of a Company to acquire the undertaking of the Ticehurst Gaslight and Coke Company, Limited, and supply gas in the parishes of Wadhurst, Ticehurst, Burwash, and other places in Sussex. Authority will be sought to manufacture and supply gas by the Mond or other process for purposes of power, heating, or incandescent lighting; and provision will be made in the Bill for enabling the Company to obtain sanction for producing and supplying electricity. Power to raise the necessary capital will be sought.

West Ham Gas.—Application will be made by the West Ham Gas Company for authority to consolidate their capital and raise more money, purchase land and construct works, deal in meters, stoves, fittings, &c., and reduce the illuminating power of their gas. It is proposed to ask for the amendment of section 14 of the Act of 1889 with respect to the reduction of the price of gas and the application of surplus profits.

There was a good audience at the Hopwood Liberal Club a few nights ago on the occasion of the delivery by Mr. Walter Whatmough, Gas Engineer to the Heywood Corporation, of a lecture entitled "How to Burn Gas." He dealt with various kinds of burners now in use, and showed how to secure the best results from the gas consumed. At the close, a hearty vote of thanks was accorded to him.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Thursday, Nov. 21.

(*Before the* LORD CHIEF JUSTICE *and Justices* DARLING *and* CHANNELL.)

Pidgeon v. Great Yarmouth Water-Works Company—Supply of Water to a Boarding-House.

In this case, which was an appeal from a decision of the Yarmouth Magistrates in July last (*ante*, p. 345), the important question was raised as to whether water supplied to the keeper of a boarding house could be said to be a supply for "domestic purposes."

Mr. F. LOW appeared for the appellant; Mr. H. GREGORY for the respondents.

Mr. Low said the question for their Lordships to decide was whether, under the provisions of the respondents' Act, a person who kept a boarding-house was entitled to a supply of water for domestic purposes. The Company contended that he could only claim a supply by agreement; whereas, the appellant maintained that he could have a domestic supply. The case arose in this way: Under the legislation applicable to this matter, if the Company refused to supply filtered water for domestic purposes, they could be summoned before the Justices, and a penalty imposed; and this course was taken in the present instance. The case as stated by the Magistrates was as follows:—

On the 29th of July, 1901, the Great Yarmouth Water-Works Company (hereinafter called the respondents) appeared before us upon the summons issued upon the information of John Pidgeon (hereinafter called the appellant), charging that they had within the last six months refused to furnish to the appellant a supply of filtered water for domestic purposes in his dwelling-house, Redenhall House, Marine Parade (he being a person entitled to demand such supply, and having paid, or tendered to, the respondents the rates for the same), contrary to section 30 of the Great Yarmouth Water-Works Act, 1853, and the Acts incorporated therewith. The sections of the Special Act of 1853 which the appellant referred to are as follows: "(30) That the Company shall, at the request of the owner or occupier of any house, or part of a house, or other person who shall be entitled to demand a supply of filtered water for domestic purposes, furnish to such owner, occupier, or other person, a sufficient supply of such water for domestic uses, at rates therein specified. (31) That such rates shall include a supply of water for one water-closet; and for every additional water-closet beyond one, and for every bath, the Company may charge not exceeding 5s. (32) That a supply of water for domestic purposes shall not include a supply of water for cattle or for horses or washing carriages, where such horses or carriages are kept for hire or by common carriers, nor a supply of water for any trade, manufacture, or business whatsoever, or for watering gardens, or any ornamental purposes whatsoever. (34) That it shall be lawful for the Company to supply any person with water for other than domestic purposes for such remuneration and upon such terms and conditions as shall be agreed upon between the Company and the persons desirous of having such supply of water." The penalties sought to be recovered by the appellant are made payable by section 43 of the Water-Works Clauses Act, 1847—one of the statutes incorporated in the Special Act.

At the hearing, it was proved or admitted, and we found as a fact, that the appellant was the occupier of the dwelling-house referred to in the summons, into which there was only one communication or service pipe from the respondents' main, and that he had requested the respondents to furnish him with a supply of water for domestic purposes in the said house, and that he had tendered to them the rates for the same, and that they, alleging that the appellant used the water for his business of a boarding-house keeper, had refused to comply with such request, but had supplied water by meter; also that the house contained ordinary sitting-rooms, ten bedrooms, two water-closets, but no fixed bath, and that water was only used in the house for cleansing, cooking, drinking, and sanitary purposes. It was proved or admitted, and we found as a fact, that the appellant received into his house, for reward, persons to board and lodge therein, who used the respondents' water, and that he carried on therein the business of a boarding-house keeper, and used the water for the purposes stated herein in connection therewith; the appellant, and his wife and family, also residing upon the premises.

It was contended on behalf of the appellant that, notwithstanding that he carried on upon the premises such business as aforesaid, he was entitled, upon the true construction of the statutes, to a supply of filtered water for the purposes for which such water was used in the house, such purposes being those ordinarily understood as domestic purposes only; and that, in deciding whether he was so entitled, we ought only to consider the purposes for which the water was required and used, and that, in the carrying on of a business, water might be properly used for domestic purposes, and that the respondents were bound to furnish such a supply. We were referred to the following cases in support of the appellant's contention: *Liskeard Union v. Liskeard Water-Works Company*, 1881 (7 Q.B.D., p. 505); *Vestry of St. Martin's v. Gordon*, 1891 (1 Q.B., p. 61); and *Smith v. Miller*, 1894 (1 Q.B., p. 192). It was contended on behalf of the respondents that where the householder carries on the business of a boarding-house keeper in his house, and water is used for any purpose whatsoever therein in connection with such business, other than for the domestic purposes of the householder and his family, the respondents are entitled to treat such user as a user for business purposes, notwithstanding that the user is confined to the purposes herein mentioned, and are only bound to supply water for such purposes by agreement. We were of opinion that the respondents' contention was the correct one; and accordingly we dismissed the summons.

The question upon which the opinion of the Court is desired is—whether we, the said Justices, being such Court of Summary Jurisdiction, upon the above statements of facts came to a correct determination and decision in point of law; and, if not, what should be done in the premises.

The LORD CHIEF JUSTICE remarked that the point appeared to be whether or not the appellant was carrying on a trade for which water was required. It was not disputed that water for washing horses, carriages, and dogs was a domestic supply.

Mr. Low said the point had not, in terms, been decided; but the decision he asked the Court to come to was a necessary consequence. In the Liskeard case, the Court held that where water was supplied to a workhouse the test was the actual use to which it was put; and in the case of *The Barnard Castle Urban District Council v. Wilson* (*ante*,

p. 397) Mr. Justice Buckley held that water supplied for a swimming bath was a domestic supply. In the case of *The Vestry of St. Martin's v. Gordon*, where the question was whether clinkers from an engine used for electric lighting were refuse of trade, business, or manufacture, an argument was used that ashes produced in a boarding-house would be trade refuse. But Lord Esher held otherwise; and the Court of Appeal decided that the Vestry were bound to remove the refuse from the hotel. Applying this case to the present as an illustration, the mere fact that the business was carried on at these premises did not conclude the matter at all. One had to show something else —namely, that the water used was for some purpose connected with the business, and was not a domestic purpose. In *Smith v. Miller*, it was held that water supplied to a boiler used for heating water for cleaning the offices was a supply for domestic purposes.

Justice DARLING said "domestic purposes" meant purposes such as cooking and washing; but if the water was supplied to a hotel for other uses, was it not for trade purposes?

Mr. F. LOW said in the present case the water was only used for cleansing, cooking, drinking, and sanitary purposes.

The LORD CHIEF JUSTICE asked whether it was not for "trade, manufacture, or business."

Mr. LOW said he should submit that it was not.

Justice CHANNELL thought the reason why this point had never arisen before was that boarding-houses were rated so high that it was not to the interest of anyone to raise the question.

Mr. GREGORY remarked that all the hotels in Yarmouth were supplied by meter, and not on the rateable value of the premises.

Mr. LOW said he should not contend that a boarding-house was not a business, any more than that a school was not a business.

Justice CHANNELL: Would it not suit your purpose to say that the water must be used directly for the business, such as that of a photographer or a baker.

Mr. LOW said: Supposing a man took in lodgers, should it be said that it was the intention of the Legislature that he should not be entitled to a supply of water? If the Justices were right in their findings, the Water Company would not be bound to supply people with water at all; and surely it could not be right that a Company should take up that position. The proper view was that, so long as the water was used only for the ordinary domestic purposes of health, it was immaterial whether or not the trade or business was carried on upon the premises; and if the Company wanted to take up the position that they were not bound to supply water, and that they would only supply it by agreement, then it rested upon them to show that the water was required for the purpose of "trade, business, or manufacture," and not for "domestic purposes."

Mr. GREGORY said the Company were willing to provide water for domestic purposes; but if it was used for trade, the supply must be by meter. The question was really one of fact; and the Magistrates had found that the appellant was carrying on the business of a boarding-house keeper, and using the water in connection therewith. He would take the case of the proprietor of hot and cold baths. The water was used for cleansing; but it could not be said that the supply was for domestic purposes. There might be lodging-houses in which there were 200 beds, and an extra sum was charged for a bath. Could it be said, in that case, that the owner was not selling the water?

Justice CHANNELL observed that the extra charge might be made in respect of the trouble of getting the bath ready.

Justice DARLING asked whether the Company's contention was that there was no difference between a hotel and a boarding-house.

Mr. GREGORY said that was his contention.

Justice CHANNELL: Suppose a person receives paying guests in his house, does the supply cease to be a domestic one?

Mr. GREGORY said it would depend on how many guests were received. That point did not arise here, because the Magistrates found that the appellant received boarders, and kept a boarding-house.

The LORD CHIEF JUSTICE: Take the case of a flat, where the landlord pays the water-rate. Can you decline to supply the occupiers except by meter?

Mr. GREGORY: Certainly; because if the proprietor charges for a hot-water supply in the rent, he is carrying on the business of a flat-owner.

Mr. LOW having been heard in reply,

Judgment was deferred till the next morning.

Friday, Nov. 22.

The LORD CHIEF JUSTICE, on the re-assembling of the Court, said: In this case the question raised is as to whether a person who keeps a boarding-house is entitled to have water upon the scale applicable to water supplied to occupiers for domestic purposes. The scheme of these Acts is nearly always the same. For ordinary domestic purposes, the water is paid for on a scale based on the annual value of the house; and the section on which the question arises is, first, that which provides that the Company shall, at the request of the owner or occupier of any house or part of a house, or other person who shall be entitled to demand a supply of filtered water for domestic purposes, furnish to such owner, occupier, or other person a sufficient supply. Section 32 provides that "a supply of water for domestic purposes shall not include a supply of water for cattle, or for horses, or washing carriages, where such horses or carriages are kept for hire or by a common carrier, or a supply for any trade, manufacture, or business whatsoever." Now, in order to deal with this particular case, I think it is necessary to bear carefully in mind what is found. The Magistrates find that the appellant was the occupier of the dwelling-house into which there was only one communication or service pipe from the main; that he requested the respondents to furnish him with a supply of water for domestic purposes in the house, and had tendered the rates for the same, and that the respondents, alleging that he used the water for his business of a boarding-house keeper, had refused to comply with such request, but had supplied water by meter; also that the house contained ordinary sitting-rooms, ten bedrooms, and two water-closets, but no fixed bath, and that water was only used in the house for cleansing, cooking, drinking, and sanitary purposes. I think the findings of fact are in this case conclusive in favour of the consumer. I consider that, under ordinary circumstances, the term "domestic purposes" does include the use of the water for the ordinary purpose of domestic life by the inmates of the house. In this case it is found, as a fact, that the only persons who use the water are the inmates of the house, who board and lodge there; and though it is quite true that the man is carrying on the business of a boarding-house keeper, he is not, in my opinion, in any proper or just meaning of the word, using the water for the purpose of his business in any other sense than that it is being supplied for the use of the inmates of the house. Of course, if the facts in any particular case show either that the water is not being used for domestic purposes, or that it is used by persons who are not inmates of the house—persons who are not living in the house in the sense of being in it as ordinary occupiers—different questions may arise. All that I intend to decide is this: If it is found that there is no use of the water except for domestic purposes, and that there is no use by any person who is not an inmate of the house, in the ordinary sense of the word, then the Company are bound to supply. I think this appeal must be allowed.

Justice DARLING: I am of the same opinion; but I must say I have come to the conclusion only after much hesitation and difficulty. It seems to me that a good deal of trouble may arise if it is attempted in any way to extend the decision which we give to-day to any other case, the facts of which may be different from this—for example, if it is attempted to extend it so as to include an inn or a hotel. The words of the statute do, as it seems to me, permit of such a case as this, where the water is used entirely for the domestic purposes of persons who are resident in a dwelling-house which has been turned into a boarding-house. It seems to me that what the statutes have done is this: They have not attempted really to make each person pay for the water which he uses except in this way —that the charge for the water supplied is calculated on the annual value of the house. The annual value of this house would obviously be raised if it were turned into a very profitable boarding-house from what it might be—an unprofitable dwelling-house; and thereby the Company might be remunerated in that rough-and-ready sort of fashion. I dare say that is why no difficulty arises in the case of many large hotels. They do not care to go into the question of whether some of the water is used for business purposes, as the annual value is so high. This case would be very different if the water were used for purposes which could not very accurately be described as "domestic"—anything beyond washing, and so on. If the person who occupied the house employed the water in a laundry, where the clothes of people outside were washed, that would be a case of carrying on business apart from domestic purposes. Some difficulty has been caused here by the decision in the Barnard Castle case. I confess that I should very much have doubted whether such a thing as a swimming-bath was ever contemplated to be covered by the words "domestic purpose." It would be a very exceptional sort of "domestic" life where they have a private swimming-bath attached to the house. But I know, as a matter of fact, that that question was not argued in the Barnard Castle case. For some reason best known to themselves, it suited Counsel in that case not to argue the question. Therefore I do not understand that to be a decision that a swimming-bath would be a "domestic" purpose, if it were seriously argued to the contrary. I was impressed rather by the fact that there might possibly be a difference between that case and this, because in the Barnard Castle case the institution supplied with water was a charitable one. I have heard from the Judge who decided the case that, even if it had been otherwise, it would have made no difference in his judgment. I think the Barnard Castle case goes a long way to help one to decide this.

Justice CHANNELL: I also agree. I think that the words "a supply of water for any trade, manufacture, or business," means some more direct use of the water in the business than the mere user of it for domestic purposes by the inmates of the house. That is a thing which is covered by the water-rate based on the annual value of the house. It is a rough way of measuring the amount of the water that is likely to be used for domestic purposes by the number of inmates which that house is capable of containing. It does not seem to make any difference whatever whether the inmates are guests who are entertained by the occupier at his own expense or pay for their board and lodging, or are pupils paid for by their parents, or are paupers paid for by the parish. I think our decision to a certain extent is governed by authority. Beyond all doubt there is a use of water for the purpose of trade in the case of hotels which would be covered by the ordinary rule. As to whether there may or may not be some kind of hotel which would not come within this definition, I offer no opinion. With reference to the Barnard Castle case, Mr. Justice Buckley was a Judge trying law and fact together; and his decision as to a swimming-bath being a use of water for a domestic purpose is entirely a question of fact, and does not govern future cases. If the school was one for teaching swimming, it would be a supply of water for "trade or business;" but, as to whether it was or not, all I can say is nothing appears in the report. The important part of that case is that he was obviously intending to include the pupils of an ordinary school as inmates of a house.

The LORD CHIEF JUSTICE: I wish to add, with regard to such matters as swimming-baths, that it is always a question of fact; and I must not be assumed to express an opinion that a swimming-bath must be a "domestic" purpose.

Mr. LOW: The appeal will be allowed, with costs, and the case remitted back to the Justices for them to deal with.

The LORD CHIEF JUSTICE: Yes.

Mr. GREGORY: I ask for leave to appeal, as this is a matter of great importance to all water companies.

The LORD CHIEF JUSTICE: It is a criminal matter, and there is no appeal.

The Fatal Gas Explosion at Dundee.

The records have recently been closed in three actions raised before Lord Kincairney, in the Court of Session, for damages in respect of death and personal injuries sustained through the gas explosion, in December last, at the premises of Messrs. Smith Bros., clothiers, the "Globe," Murraygate, Dundee. John Cameron claims £500 in respect of the instantaneous death of his son; Susan Cameron claims £1000 in

respect of serious personal injuries which she sustained; and Nellie Sloggie claims £1000 also for serious injuries. The explosion not only wrecked the workshop and caused serious structural damage to the premises, but resulted in the instantaneous death of two persons and serious injuries to others. The floor of the basement portion of the premises is a double one; the lower part being of concrete and the upper part, which is about a foot above it, being of wood. Gas-piping had been laid between these, and supplied light to upright standards placed in different parts of the workshop. These standards were fixed or screwed into flat plates and sockets attached to the floor. It was at one of these standards that the explosion occurred, while the escape of gas was being traced by the aid of a lighted candle. Pursuers say that for weeks previous to the accident the defenders knew that a considerable volume of gas had been escaping into the workshop; and that complaints were repeatedly made by the employees, but that nothing was done to remove the cause of danger. The gas-piping was old; and the fittings of the standards were defective, especially in the vicinity of the explosion. It is said that the accident was caused through the gross and culpable negligence of the defenders in allowing an escape of gas to exist and continue without adequate examination or reasonable endeavour being made to remedy the same. Had the defenders, on their attention being called to the bad escape of gas, engaged a plumber or other practical man to remedy the defects, the accident would never have occurred. The system which the defenders had of removing the standards and placing brass blocks in the sockets was dangerous, and led to gas escaping between the floors and permeating the room in which the explosion occurred. The defence is that the injuries were the result of a pure accident, or due to the fault of a fellow-workman, who had the light. The statements as to complaints and defenders' knowledge of the escape of gas, and as to the condition of the fittings, are denied. It is stated that the building is entirely new; and that the fittings were thoroughly tested and examined by the Gas Commissioners before a meter was granted and connection to the mains allowed. In each case issues were ordered for jury trial.

Disputed Coin Meter Consumption.

At the Chester Police Court, on Tuesday last, a consumer was summoned by the Gas Company for the non-payment of a sum due for a supply of gas by automatic meter. The index of the meter showed that 13s. was due for gas, but only 9d. was in the slot; so that it was assumed defendant had been receiving gas without placing the requisite money for it. Mr. J. R. Thomson, J.P., said he always understood it was impossible for a person to do this. The official said that was not so. Mr. Thomson remarked that this was a very serious matter, and such as might have an injurious effect upon the business throughout the city. It was explained on behalf of the Company that persons signed forms agreeing to pay according to the index of the meter. Defendant said that during six weeks the meter had been registering in favour of the Company. He had complained; and the Company sent a man to examine the meter, and he pronounced it to be correct. The Magistrates' Clerk said that the index having shown the amount to be due, defendant must pay. An order was therefore made.

Charge Against a Trade Union Secretary.

At the Clerkenwell Police Court, last Thursday, before Mr. D'Eyncourt, William Poole, a labourer, of No. 7, Oak Street, Millom, Cumberland, was charged on remand with withholding £26 17s. 3½d., the money of the National Union of Gas Workers and General Labourers of Great Britain and Ireland. Mr. Lawless, who prosecuted, said the proceedings were instituted under section 12 of the Trades Union Act, 1871; and he was asking the Magistrate to exercise the power he had under the section of making an order for the repayment of the money. The Union had 350 branches in various parts of the country. The defendant was the Branch Secretary at Scunthorpe; his appointment having taken place in 1895. It was his duty to receive sums of money from members through the collecting stewards, enter the amounts in a contribution-book, and send the money weekly to the head office in Pentonville Road. At the end of each quarter, he was, in addition, required to submit a balance-sheet. Since the beginning of this year, some difficulty was experienced in getting balance-sheets from him. He made various excuses for his behaviour, and in August he disappeared. His contribution book was obtained from his wife; and investigation showed that from December, 1900, to August last, he was short to the amount named. His balance-sheets misrepresented the real sums he had received; and in his contribution-book he had omitted to enter some amounts, while others were less than those he had received. Further, some of the items entered in the contribution-book had never been forwarded to the head office. The defendant said he might have made mistakes; but he did not act wilfully. He had been energetic in taking up compensation cases for operatives, and in consequence had been boycotted by employers. He was unable to get employment; and three of his sons were thrown out of work. Mr. D'Eyncourt made an order for the repayment of the money, and ordered the defendant to pay a fine of £10—in default, three months' imprisonment.

Telegraphing from New York on the 12th inst., a correspondent of "The Times" said: A warning to Yellow journalism was given to-day in Chicago, where Judge Hanecy, of the Circuit Court, sentenced the Managing Editor of Mr. Hearst's "Chicago American" to 40 days', and the writer of an article in the same paper to 30 days', imprisonment. The paper is owned by Mr. William Hearst, the proprietor of the "New York Journal" and the "San Francisco Examiner." It agitated against the Gas Companies, and Judge Hanecy gave a decision in their favour, whereupon the newspapers attacked him. A number of employees of the paper were charged with contempt of Court. The Financial Manager and the Assistant City Editor were discharged. Mr. Hearst himself, Mr. Davenport, the Artist, and one other man, have not appeared to answer the charges, and the Judge announced that the cases against them would stand until they appeared voluntarily or were brought before him by the Sheriff.

MISCELLANEOUS NEWS.

ANSWERS TO QUESTIONS ON GAS MANUFACTURE.

By A. V. HENDRICKSON, First-Class Honours Certificate, City and Guilds, May, 1901.

The following "Answers to Questions on Gas Manufacture" have been written in the hope that they may prove useful to students for the next examinations. The questions cover most of the ground of the Honours Grade (City and Guilds Examination) set in May this year, together with others set in previous years. Although perhaps to the Ordinary Grade student the answers will be the more useful, yet it is hoped that the aspirant for a First-Class Honour will also find in them some information worth noting.

(1) Give a short account of the different kinds of coal and the distinguishing features of each kind.

Coals are divided into three classes—namely, (1) lignite, (2) bituminous, and (3) anthracite.

Lignite, though somewhat similar in appearance to caking coal, is of not much use for gas-making purposes; consisting, as it does, chiefly of water, hydrogen, and fibrous or organic matter. Occasionally this kind of coal possesses a brown colour, and on distillation yields a large amount of water vapour, only a poor-quality gas, though in large quantity—say, 13,000 cubic feet of 9-candle gas. It also evolves a large amount of sulphur, which, being an impurity, has to be removed, thus adding extra cost to the item of purification. It also leaves behind in the retort a fair amount of ash, of a woody, fibrous nature, together with about 60 per cent. of coke, which latter is practically useless. The tar and liquor produced have a very objectionable odour, and are of but little value. The specific gravity of lignite ranges from 1·1 to 1·3. The coal contains a high percentage of hydrogen (about 6 per cent.), and consequently is more easy to ignite than the other varieties of coal.

Bituminous coals are the most useful for the production of gas. They are found fairly abundantly in Northumberland, Durham, and, in fact, most English coalfields. Taking them as a class, they are of a fairly soft laminated structure, having more or less shiny, lustrous layers throughout their thickness; such layers often being fractured. In the vertical cracks are sometimes to be found calcareous scale and deposits of iron pyrites (FS_2). The specific gravity of bituminous coal averages about 1·2; while its colour varies from a resinous to a dirty black. It is fairly compact, but not homogeneous. On distillation, it yields about 10,000 cubic feet of 16-candle gas as tested by a "London" argand, together with 10 to 11 gallons of thick tar of 1·2 specific gravity (equal to 132 lbs., or 5·9 per cent. by weight, per ton of coal), and 13 to 30 gallons, or 5·9per cent. by weight, of ammoniacal liquor. After distillation, it leaves behind from 60 to 80 per cent. of coke of good average quality, containing from 1 to 4 per cent. of ash.

The gas given off is fairly permanent; but with extreme changes of temperature, it has a tendency to deposit naphthalene. Also, if allowed in winter to stand in the holder for long, it may become impoverished to the extent of 1 candle in illuminating value. An analysis of the coal gives approximately: Carbon, 73 per cent.; hydrogen, 5 per cent.; nitrogen, 2 per cent.; and oxygen, from 7 to 10 per cent.

Sulphur is the chief impurity in bituminous coals, and generally exists as iron pyrites. The total amount of impurity found in the gas averages 43 grains of sulphur other than sulphuretted hydrogen, together with 1·5 per cent. by volume of carbonic acid (or 12 grains per cubic foot), and 1·5 per cent. by volume of sulphuretted hydrogen (or 9 grains per cubic foot). Some kinds of bituminous coal, when heated in the retort, "cake" or "coke" together, for which reason they are designated "caking coal."

Under the heading of bituminous coal, comes cannel coal. This is the richest coal for gas production. It is a hard, non-laminated, and homogeneous coal. The richer descriptions are dull and brown, the middle classes are bright and black, while the poorest are dull and black. The richest kinds of cannel sometimes have an earthy appearance, and are then known as shale. Australian shale is an example. This latter gives 14,500 cubic feet of 48-candle gas. The poorest cannel yields 10,000 cubic feet of 20-candle gas; and thus the worst kinds of cannel yield richer gas, as regards illuminating power, than the best bituminous coal. The specific gravity of cannel is about 1·2.

True cannel does not cake on heating, but leaves a coke similar in nature to the coal, though there is a cannel found at Wigan that does cake, and consequently is known as "caking cannel." The tar obtained is greater in amount than that from caking coal, but is thinner, and consequently of less specific gravity. Cannel generally contains more ash than bituminous coal; while the carbonic acid found in the evolved gas is also greater. The sulphuretted hydrogen is less; and more sulphur as bisulphide of carbon is obtained than from caking coal. Cannel gives off its gas in about one sixth less time than caking coal. It is found chiefly in Scotland and Wales.

The third division—namely, anthracite—is not of much interest to the gas maker, as it consists chiefly of carbon (of which it contains about 95 per cent.) water, and ash. Anthracite is found chiefly in Wales and America.

(2) How would you determine the specific gravity of coal, and what useful purpose does a knowledge of this specific gravity serve?

The specific gravity of coal can be determined by two methods: (1) The specific gravity bottle method, in which—water being taken as the standard of comparison = 1000—a ratio is found between a certain weight of coal and the weight of an equal volume of water displaced by the coal. (2) By weighing coal in air, and then in water, by means of a delicate chemical balance. This method is generally used where absolute accuracy is not essential.

The Specific Gravity Bottle Method.—The bottle itself is a small one,

holding, at 60° Fahr, exactly 1000 grains of pure water; its stopper being part and parcel of a thermometer. The coal to be experimented with must be small enough to pass through the neck of the bottle, and free from dust. A convenient weight is 250 grains. The weight of the bottle being already known, the weighed quantity of coal is placed in it. The bottle is now filled with pure distilled water; and, noting that there are no air-bubbles, the stopper is replaced, and the whole again weighed. (This is rendered necessary by the fact that the bottle does not weigh 1250 grains now, owing to the water displaced by the coal.) The difference in the weight now obtained, from the total weight of the coal and the bottle when full of water, gives the weight of the water displaced by the coal. From these data, the specific gravity of the coal is found; the rule being—"Divide the weight of coal by the weight of water displaced. Example:—

Weight of bottle (when full of water)	1000	grains.
Weight of coal taken	250	,,
Total weight of coal and bottle . . .	1250	,,
Weight of coal and bottle with sufficient water to fill the latter	1050	,,
Weight of water displaced by the coal	200	,,

Therefore, dividing the weight of coal by the weight of an equal bulk of water, gives the specific gravity of the coal, which, in the above case, is $\frac{250}{200} = 1{\cdot}25$ (water = 1·000).

Three tests should be taken, and the average accepted as the true figure.

From the specific gravity, the weight of a cubic foot of the coal can be ascertained; and from this, the space in cubic feet a ton of the same coal would occupy. Thus: To obtain the weight of a cubic foot: As a cubic foot of water, at 60° Fahr. weighs 1000 oz. (and as the weight of the above coal to the water is as 1·25 to 1), it follows that a cubic foot of coal having a specific gravity of 1·25 will weigh 1250 oz., or 75 lbs. avoirdupois. To calculate the space from this that a ton of the coal would occupy: If 75 lbs. occupy 1 cubic foot, 2240 lbs. (1 ton) will occupy x—

$$75 : 2240 :: 1 : x \text{ and } x = 29{\cdot}86 \text{ cubic feet.}$$

(3) Give a method, with data, for estimating the quantity of ash in a given sample of coal.

About 25 grains of finely powdered coal are placed in a weighed platinum boat (easily made by bending a piece of platinum foil to this shape); the latter being then inserted into one end of a piece of wide combustion tubing; of such size as to allow of the easy insertion and withdrawal of the "boat." The end of the tube holding the boat is then strongly heated, by means of a splayed out bunsen (the heat, of course, not being sufficient to fuse boat and glass together); a gentle current of air at the same time being drawn through the tube by means of an aspirator connected to the end of the tube farthest from the boat. The air must pass slowly. The heat is continued for about three hours, till all black specks have disappeared, and the residual ash is of a yellowish colour. The boat and contained ash are then allowed to cool, and afterwards weighed; and the resulting ash is the equivalent of the coke used. If, as in the above case, 25 grains of coke were taken, then to get the percentage, the figures obtained will have to be multiplied by 4. An average of three tests should be taken. Coal contains from 3 to 12 per cent. of ash; Scottish cannels generally giving the higher quantity.

(4) Describe the apparatus, and state how you would test a sample of coal so as to ascertain its suitability or otherwise for the manufacture of gas.

For this purpose, a small experimental plant is used, as testing every sample of coal on a working scale would hardly be possible. The apparatus consists of a small cast-iron ⏢-retort, 6 inches wide, 4 inches high, and 3 feet long, heated by a direct fired furnace. The gas from the retort is led, by means of a 2-inch ascension-pipe, direct to the condensers, which are pipes of about 1 inch diameter, and 7 feet long, placed far enough away from the furnace so that they act as condensers, having attached to their bottom ends a small oblong receptacle for receiving the products of condensation. As in this small plant no washer or scrubber is used, the gas from the condensers passes to the purifying boxes, which preferably are about 15 inches square and 8 inches deep, containing two trays on which the purifying material (generally slaked lime, CaH_2O_2, as this absorbs both the carbonic acid and sulphuretted hydrogen) is placed to a depth of 2 inches. The outlet of the purifiers is in connection with a gasholder of about 15 cubic feet capacity, graduated, so that its contents can be readily and accurately read off. It is an advantage if, from the outlet of the holder, a pipe is connected to a photometer, so that the illuminating power of the gas made can be ascertained. A preliminary charge should be carbonized, and the resultant gas blown away at the holder (which can be provided with a tap for this purpose), so that all the air in the apparatus passes through.

The heat of the retort being maintained at a bright red (about 1600° Fahr.), a charge of the coal of 2·24 lbs.—1-100th of a ton—is placed in the retort by means of a cast-iron scoop 3 feet long. The retort-lid (which should previously have been coated, where it touches the retort-mouthpiece, with a mixture of spent lime and damp clay, or damp clay alone, so as to make the retort gas-tight) is quickly placed in position, and the taps on the ascension-pipes, condenser, and holder inlet opened; the holder being weighted so that a pressure-gauge placed on its inlet shows no pressure.

The charge, which, of course, should be a fair average sample of the particular coal, will take from 20 to 30 minutes to work off; the end of the distillation being seen by a pressure-gauge, on the inlet (say) of the condensers or purifiers, showing level gauge—the holder being shut off, or the gas from this will affect the gauge. The cocks on the ascension-pipe and the inlet of the holder are now closed; and the coke is drawn from the retort into a clean iron vessel, and carefully weighed. The tar and liquor (which should be allowed to accumulate from two or three charges, as this larger quantity enables the better measurement) are drawn off from the bottom of the condenser, and the amount calculated to one charge, and from this to 1 ton of the coal. The volume of gas in the holder, after being allowed to stand so as to thoroughly mix (a thermometer being inserted in the crown to give the existing temperature), is calculated to normal temperature and pressure—that is, 30 inches barometer and 60° Fahr. The illuminating power of the gas should now be found by means of a photometer, being first allowed to burn for a short time, so as to make sure that the air in the pipes has passed through.

The yield of gas obtained will be higher by about 3 per cent. than that obtained if the coal was used on a large scale. The illuminating power will also be greater, owing to the fact that in ordinary working higher heats and exhausters, &c., reduce the lighting value of the gas—the higher heats by giving a larger volume of poorer gas, and the exhausters (probably) by drawing in a certain amount of diluent gases. Another cause, too, of lower illuminating power is the washer, where the gas, meeting comparatively cold liquid, has some of its illuminants abstracted.

(To be continued.)

FURTHER POWERS FOR THE SOUTH METROPOLITAN GAS COMPANY.

Notice has been given by the South Metropolitan Gas Company of their intention to apply to Parliament for various additional powers. They wish, in the first place, to purchase, compulsorily or by agreement, certain lands, foreshore, buildings, and other property, situated in the Parishes and Metropolitan Boroughs of Greenwich, Lambeth, and Southwark, and to be empowered to hold such as have been purchased. It is proposed to stop up and divert roads and footways on these lands, or to construct gantries over them. The Company will ask to be empowered to purchase by agreement and take on lease such additional lands as they may need for the purposes of their undertaking, to hold such as may have been purchased prior to the passing of the intended Act, and to dispose of any not required, and on any lands possessed by them to erect houses, cottages, and dwellings for their officers and servants, and for any of the purposes of their undertaking, except the manufacture of gas and the conversion of residual products, or to grant building leases for these purposes, and dispose of such houses and cottages, and the leases and the reversion thereof. They also wish to have power, on certain lands at Greenwich, or on some parts thereof, to construct and maintain works for the manufacture of gas and the conversion of residual products and their purchase and sale. It is proposed to repeal, alter, or amend the provisions of the City of London Gas Act, 1868, and of the Gaslight and Coke and other Gas Companies Acts Amendment Act, 1880, relating to the testing of gas for illuminating power and purity, so far as they deal with the gas supplied by the Company or to the Company in relation thereto, substitute therefor the provisions of the Gas-Works Clauses Act, 1871 ("Testing of Gas") and ("Penalties"), and provide for the payment and compensation to persons for any loss of emoluments by reason of the foregoing provisions. It is further proposed to repeal, alter, or amend section 17 of the scheme agreed upon in 1880 for the amalgamation of the Company with the Phœnix Company, so as to permit of the increase of the remuneration to the Directors of the Company; also to repeal or amend the first proviso to section 3 of the South Metropolitan Gas Act, 1901, limiting the time within which the Company and the Gaslight and Coke Company may enter into agreements for the transfer to the Company of the portion of the undertaking of the latter Company south of the River Thames. Additional capital will be required; and application will be made for the amendment of section 5 of the Company's Act of last session, so as to provide that the amount to be raised thereunder shall include the premiums to be obtained on the sale.

THE BREAKING UP OF LONDON STREETS.

Increased Powers for the Corporation.

The Corporation of London have given notice of their intention to apply to Parliament next session for further powers with respect to the breaking up and interference with the public thoroughfares, in the laying of mains and pipes, wires, &c., by companies and others, so that they may be able to exercise a more thorough control over the streets. In the Bill to be promoted, provision will be made that, before opening any street for the purpose of commencing any alteration, renewal, or extension of any existing mains, pipes, cables, wires, tubes, or other apparatus situate thereunder, or of commencing to lay or place any such appliances in or below any street, the parties intending to commence the work shall give to the Corporation, to the Commissioner of the City Police, and to all other persons having statutory or special powers affecting such street, not less than two months' notice in writing (accompanied by proper plans, sections, and other particulars) of their intention. The Corporation may thereupon make such requisitions as they may deem necessary or expedient, or as may be provided in the Bill. When a street has been opened, it is not to be broken up again, after permanent reinstatement and restoration, without the consent in writing of the Corporation (except in cases of emergency, or for connecting service-pipes or wires), for a fixed period to be prescribed; and the Corporation are to be enabled to enforce their determination by penalties, or such other means as may be found necessary or expedient, or as may be defined. It is proposed that the Corporation shall be authorized to prescribe during what days and hours, whether by day or by night, parties shall be permitted to exercise their statutory rights to open streets; and also to require and compel temporary reinstatements and restorations of the surface of a street to be made. Whenever works involving the opening of more than one street are to be undertaken, the Corporation are to be empowered to determine the sequence or order in which, and the point or points at which, such opening is to be made, and also to prohibit any departure from their requirements. They are likewise to be authorized to make bye-laws

or regulations in regard to this matter, and enforce compliance therewith. Arrangements will be made for enabling the parties concerned, in certain cases, to appeal from all or some of the requirements, directions, or orders of the Corporation, to the Board of Trade or other Government Department, to a person to be nominated and appointed by such Board or Department, or to some other body or person to be prescribed. The provisions of the Bill are to apply within and throughout the city.

PROPOSED WATER LEGISLATION FOR LONDON.

The Government's Purchase Bill.

Last Tuesday morning, formal notification was made of the intention of the Government to introduce a Bill next session to incorporate a Water Board to acquire and carry on the undertakings of the eight London Companies and the Staines Reservoirs Joint Committee.

The Bill will define the constitution of the Board, and provide for the representation thereon of the Councils of certain counties, boroughs, and urban districts, the Corporation of the City of London, and the Conservators of the Rivers Thames and Lea, and any other bodies or persons that may be named in the intended Act; make provision for the election, appointment, qualification, powers, and duties of the members; regulate its proceedings; and provide that the limits within which it shall have jurisdiction and supply water shall be the area in which any of the Companies are authorized to supply water, and the parishes of Sunbury, Chessington, and Cuddington, or such parts or parts of the area and those parishes as may be specified in the intended Act. It is proposed to confer on the Board all such powers as may be deemed necessary or expedient for performing their duties, and for carrying into effect the objects of the intended Act, including all or some of the powers conferred on sanitary authorities by the provisions of the Public Health Acts relating to water supply, and to extend to any parish or place within the water limits all or some of the provisions of the Acts of any of the Companies supplying water in such parish or place, and of any General Act applying to the Companies.

The undertakings of the Companies will be defined as including "all water-works and works connected therewith, and all other property, real and personal, and all estates, interests, easements, and rights, whether equitable or legal, including things in action, registers, books, accounts, deeds, and documents, and any property belonging to, vested in, or held in trust for, the Companies, and all powers, rights, jurisdictions, capacities, privileges, and immunities, duties, responsibilities, obligations, liabilities, and debts possessed by, attaching to, vested in, or belonging to, the Companies, or such part or parts thereof, as may be defined by the intended Act." A date will be fixed as from which the undertakings will become vested in the Board; and thereafter the duty and right of the Companies to supply water will cease.

Provision will be made for the transfer of the undertakings to the Board on the day appointed, and for the payment to the Companies of the sums of money or other consideration agreed upon, or determined by arbitration; and the Companies will be empowered to enter into the necessary agreements with the Board for the purpose. The Board are to be enabled to redeem, purchase, or extinguish any existing debentures or debenture stock, or mortgage or other debts of the Companies; and a majority of the holders of any class of mortgage securities ascertained in manner provided in the intended Act are to bind all holders of securities of that class as to the price or other consideration to be paid, and the submission of any question to arbitration.

The Bill will necessarily contain clauses providing for the nomination or appointment of an arbitrator or arbitrators to settle and determine the amount of the purchase-money or consideration for the acquisition by the Board of the undertakings, and the terms and conditions of such acquisition, and for the redemption or purchase and extinction of any mortgage securities. The person or persons so appointed will determine any questions which may arise between the Board and any of the Companies, or the holders of any mortgage securities, or in carrying out the provisions of the intended Act, and prevent any allowance being made in respect of any compulsory sale under it, or the consideration of any enhancement or depreciation of the market value of any shares or stock of any of the Companies, or of any mortgage securities which, in his or their opinion, is due to the passing, or anticipation of the passing, of the intended Act. They are to have power to authorize allowance to be made in respect of any costs of re-investment of the sums or consideration to which a shareholder or stockholder of any of the Companies, or the holder of any mortgage securities, may become entitled, or in respect of any other costs which such persons may incur in consequence of the intended Act; and such other powers as may be necessary or desirable to enable them to deal with and settle all questions arising under it, and thereby referred to their arbitration. Provision will be made that the awards, orders, and other determinations of the arbitrator or arbitrators shall be binding and conclusive, and shall not be removed to, set aside, reviewed, or questioned by any Court, and also the payment of the costs of the arbitration, &c.

All stocks, funds, and moneys held by the Chamberlain of the City of London, and applicable as sinking funds for the purchase of the undertakings of certain of the Companies, are to be transferred to the Board. Any person entitled to a payment by the Board is to be at liberty to accept it in the water stock or other securities to be created by the intended Act. The Bill will provide for the application, apportionment, and distribution of any moneys or other consideration received by the Companies from the Board (including, if necessary, the allocation of the lands, works, property, powers, and liabilities of the Staines Reservoirs Committee, or the value thereof, between the respective undertakings of the New River, Grand Junction, and West Middlesex Companies); for the settlement of any questions and disputes which may arise in the course of such application, apportionment, and distribution; and for the winding up and dissolution of the Companies.

Provision will be made for transferring to, or vesting in, the councils of certain boroughs and urban and rural districts, by agreement or compulsion, all works for the distribution of water situate in their districts, and not necessary for supplying with water any other area, upon such terms and conditions as may be specified in the Act. Any expenditure by the Councils for the purpose will be provided for; and there will be conferred upon them any necessary or desirable powers of borrowing money in respect thereof. The Board are to supply water in bulk to such local authorities, whether within or beyond the water limits, upon such terms as may be specified. They are to be enabled to combine and amalgamate the systems of all or any of the Companies, and utilize within any part of the water limits any water obtained by them; and also to execute any works authorized by Parliament, lay mains and pipes, and open streets.

Other provisions of the Bill will relate to the borrowing of money; the apportionment of the expenses (so far as they are not met by income) between the areas within the water limits; the definition of the rate or rates out of which such expenses are to be payable; and the recovery of the expenses. It is intended to arrange for the alteration, by Provisional Order or otherwise, of the representation of any area within the water limits or of any constituent authority, for the representation of any other authority upon the Board, or for changing the number of members. The Board are to have the right of inspecting the lands, works, and property of the Companies; and provision will be made for carrying on their business, taking over their officers and servants, and compensating them and the Auditor of their accounts. They are to be enabled to enter into possession of the undertakings on the appointed day, and "before the ascertainment of the consideration money." But payment is to be made by the Board of the interest falling due on any mortgage securities until they are redeemed, and also, in lieu of interest on the purchase money payable for their undertakings between the appointed day and the date of payment of such purchase money, of such sums as may be prescribed by the Act; and they are to be authorized to pay to the Companies the sums on account of the full consideration which may become payable to them under the Act before such consideration is ascertained. They are to have power to appoint Committees and Sub-Committees; make and enforce bye-laws, rules, regulations, and scales of charges, and impose penalties for the breach thereof; continue the regulations, charges, &c., in force on the day of transfer, until repealed or altered; and to vary and extinguish all powers, rights, authorities, and privileges inconsistent with, or which would interfere with, the carrying into effect of any of the objects and purposes of the intended Act, or of the purposes for which the Board is constituted. Provision will be made for the holding of inquiries by the Local Government Board, and for the payment of the costs thereof; for conferring upon any person holding such inquiries the powers of an Inspector of that Board under the Public Health Acts; and for any matters which may be ancillary to, or consequential on, all or any of the purposes of the intended Act, or necessary or expedient therefor.

The various Acts of the Companies and of the Staines Reservoirs Joint Committee, as well as the Metropolis Water Acts, 1852, 1871, 1897, and 1899, the Thames Conservancy Act, 1894, the Lea Conservancy Acts, the Water-Works Clauses Act, 1847, and any other Act relating to the Companies or to the Joint Committee, the Rivers Thames or Lea, or the Conservators thereof, are to be altered, amended, enlarged or repealed so far as may be necessary for the purposes of the intended Act.

The County Council's Bill.

As recorded in the "JOURNAL" a fortnight ago, the London County Council resolved, on the recommendation of their Water Committee, to re-introduce their Bill of last session to authorize the transfer to them of the undertakings of the Water Companies, by agreement or on terms to be settled by arbitration. The customary notice has now been given. The Bill will define the undertaking of each Company as including their water-works and works connected therewith, and all property, both real and personal, money, securities, and effects, and all rights, powers, authorities, and privileges of the Company, of whatever nature and description, or some part or parts thereof. It will fix a date as and from which the undertaking of each of the Companies shall be transferred to the Council, and a date as and from which the purchase-money or consideration for the transfer shall be calculated and ascertained. It will make provision for the appointment and procedure of the arbitrator or arbitrators, and indicate the method of arbitration and ascertaining the amount of the purchase-money and the settlement of the terms of purchase. Provision will be made that "the fair and reasonable value of the undertaking shall in each case be paid, without any addition thereto in respect of compulsory sale." In the event of the transfer, the several Companies and the Staines Reservoirs Joint Committee will be dissolved. Arrangements will be made for the management and administration of the water supply; for the appointment of a Water Committee of the Council, and the representation of the Corporation of London and other bodies thereon; for the transfer of parts of the undertakings and the supply of water in bulk to extra-Metropolitan County Councils or Local Authorities, who are to have power to promote Bills; for the application of the sinking fund, held by the Chamberlain of London; and for the conversion, redemption, or extinction of debentures and debenture stock, &c. Arrangements will be made for the creation of stock or securities, and for charging all costs and expenses upon the water and county rates.

Applications by the Grand Junction and Kent Companies.

The Grand Junction Water Company have given notice of their intention to apply for an extension of their limits of supply so as to include the parish of Sunbury, in the urban district of Sunbury, in the county of Middlesex, and for authority to exercise their existing powers within such enlarged limits. It is proposed to purchase additional lands by agreement, and construct works thereon; also to sell certain lands at Campden Hill, and to ask for exemption thereof and the Company from the provisions of the Lands Clauses Consolidation Act, 1845. Section 3 of the Company's Act of 1878 is to be amended by excluding from incorporation therewith the provisions with respect to the communication-pipes to be laid by them, and also section 35 of the Water-Works Clauses Act, 1847. More capital will be required. This will also be one of the objects of the application to be made to

Parliament by the Kent Water-Works Company; and they propose to raise the money by the issue of debenture stock. They will also apply for an extension of their limits of supply so as to include the parish of Tatsfield, in the rural district of Godstone, and such part of the parish of Westerham, in the rural district of Sevenoaks, as is not now comprised within their area, and for authority to exercise therein all their existing rights and privileges. They wish to be enabled to supply water in bulk to any local or other authorities, bodies, or persons within or beyond their area, and to enter into, and carry into effect, agreements for the purpose; also to acquire by agreement certain lands and easements for purposes to be specified in the Bill.

DUNEDIN SUBURBAN GAS COMPANY, LIMITED.

The Annual Meeting of this Company was held on Wednesday last, at the London Offices, No. 2, East India Avenue, E.C.—Mr. F. DUTTON in the chair.

The SECRETARY (Mr. E. J. Broadbent) having read the notice convening the meeting and the report of the Company's Auditor,

The CHAIRMAN moved the adoption of the report and accounts, which were noticed in last week's "JOURNAL" (p. 1333). He said there was very little of moment to bring before the shareholders on this occasion. The accounts presented showed very much the same condition of things as had existed for several years past—that was to say, the Company had improved their position all along the line. The movement was not a large one, but still it always tended in the right direction. The business seemed to be of the slow-and-steady kind, which generally arrived at the proper destination; and, in course of time, he had no doubt they would have to deal with figures of a very much more substantial nature, and consequently be able to declare dividends in proportion. During the twelve months to June 30 last, the total receipts amounted to £5034, as compared with £4704 in the previous year. In Dunedin this year, the profit made amounted to £1667, as against £1612 to June, 1900. This was not so large an increase as the actual rise in the receipts, which was accounted for to some extent by the fact that, though they had done a larger business, coal had been costing them a higher price than they cared to see it at. The total expenditure had amounted to £3589, as compared with £3556; and the balance carried to net revenue was £1444, against £1219 It would no doubt be noticed that the actual balance to net revenue was in larger proportion than the difference between the profit in Dunedin and the items of expenses. This was in a measure due to the fact that the general administrative charges were rather less, and also to the fact that as they went on increasing the reserve fund they, of course, derived a larger revenue from the interest on their investments. With regard to the gas consumption, this was slightly more—about 300,000 cubic feet. They had in the course of the year laid over half-a-mile of additional mains, all of which had been provided for, according to their present custom, out of revenue; so that there had been no increase at all in the capital account. The number of meters fixed was 803, as compared with 763. It would therefore be seen that, although there had been no big jump in their business, still in every department there were signs of increasing prosperity. The satisfactory feature of this was that as the earning power of the Company in Dunedin grew, so also the actual value of the undertaking was necessarily increased. Should they at any time have to approach the question of the sale of the works—and this was an idea which, though not in evidence at the moment, was not entirely excluded from their minds—to the Corporation of Dunedin or some other body, the earning power of the business would certainly become a very important factor in determining the price. They were at the present time in negotiation with the borough of St. Kilda for an increase in the number of lamps for public lighting. There were now only four lamps in the district, and the idea was to erect twenty-one additional ones. The matter was not yet decided; but still it furnished a satisfactory outlook. It was only very recently that they had any public lamps at all in St. Kilda; and he was glad to know that these were found to answer so well that the authorities were anxious to increase the number. Though the Company did not at any time make a large profit out of public lighting, it was in its way a very excellent advertisement. The fact that an increase in the public lighting of the district was under discussion drew attention to the Company, and he thought could not fail, in the ordinary course of things, to bring in its train additional consumers. This explained the position of the business. With regard to the distribution of the profits, it would be seen that they had this year £1574 to deal with; and they might almost have increased the dividend from 1¾ to 2 per cent. He must confess that personally he was at first very much inclined to do this. The all-round prosperity which existed in every other department, he should have liked to have seen also attaching to the dividend. But they had an Auditor who was very mindful of the shareholders' interests, and who was most anxious that the amount placed to reserve should be increased. Therefore, on his advice, the Board eventually decided to place a rather larger sum—£600 as against £400 last year—to reserve; and, under these circumstances, they did not think it prudent to increase the dividend. The amount carried forward to next year's accounts was £327, as compared with £267 in the twelve months to June, 1900. Though not wishing to give the shareholders anything in the shape of an actual undertaking on the subject, he thought that if in the year which they had now entered upon they had (as he hoped they would have) some slight increase in their business, there was a reasonable probability of their being able to make the dividend 2 per cent. It would be easily understood that, so far as the Directors were concerned, they did not in any department want, having made a step forward, to have to go back again. Therefore they would like to feel as certain as was possible in such matters, that, when they started paying dividends on an increased scale, they would be able to continue to do so.

Mr. ALLAN CAMPBELL seconded the motion, and it was carried unanimously.

The proceedings concluded with the re-election of the retiring Director (Mr. Dutton) and the Auditor (Mr. W. Stansfield).

ORIENTAL GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held last Wednesday at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. R. HESKETH JONES in the chair.

The SECRETARY (Mr. H. J. Luff) having read the notice calling the meeting,

The CHAIRMAN said that at an extraordinary meeting of the shareholders held on Oct. 23 last, the resolution which he had now to submit for confirmation was discussed, and unanimously passed. Therefore he did not think it necessary to say anything further on this occasion; and he would simply move—

That the following resolution, which was passed at the extraordinary meeting of the Company held on Wednesday, Oct. 23, 1901, be confirmed: "That the capital of the Company be reduced by reducing the amount of each of the 30,000 shares of £5 each, on each of which shares the sum of £4 10s. has been paid, to a share of £4 10s. fully-paid, and cancelling the uncalled capital of ten shillings per share on such £5 shares, and by reducing the amount of each of the 15,000 shares of £5 each, on each of which shares the sum of £1 has been paid, to a share of £1 fully-paid, and cancelling the uncalled capital of £4 per share on such last above-mentioned £5 shares."

Mr. H. D. ELLIS seconded the motion, which was adopted.

An Ordinary General Meeting of the shareholders was then held for the purpose of receiving the annual report and accounts and transacting the usual business.

The SECRETARY having read the notice convening the meeting, it was agreed to take as read the Directors' report and the accounts, from which particulars were given in the "JOURNAL" last week.

The CHAIRMAN said since the last annual meeting of the shareholders, there had been some important changes in connection with the Company. They had got rid of their old Articles of Association, and were now carrying on the business under more modern rules. They had passed resolutions to extinguish the liability of those shareholders who held the £4 10s. and the £1 paid-up shares; and the share capital was now represented by the amount actually paid up. Early in the New Year, after the necessary proceedings had been taken to obtain legal sanction to do so, the Directors would call the shareholders together again to pass resolutions to convert the paid-up share capital into one uniform paid-up consolidated stock. During the past year, they had closed with the Corporation of Calcutta for the new public lighting contract for ten years; and when it was considered that seven-tenths of the consumption of gas was in public lighting, the shareholders would see how important it was to the Company to secure this supply. They had, of course, had to make some reduction in the price. But he was happy to say they obtained a very fair profit under the new contract; so that he might venture to state that their 8 per cent. dividend was fully assured—for the next ten years, as far as could be seen. On June 30 last, they had upwards of £40,000 invested in gilt-edged securities, with no debenture or mortgage debts, which in 1892 amounted to £42,000. This improved stability was really due to the reduction of the dividend to 8 per cent. On taking his seat at the Board nine years ago, his (the Chairman's) colleagues agreed with him that it was advisable this should be done; and the shareholders concurred. The result was, as he had said, they now stood in the happy position of having upwards of £40,000 invested and no debenture or mortgage debt. Having read the certificate of the Auditors appended to the accounts, the Chairman proceeded to comment on the latter. He said that, turning to the balance-sheet, and to the latter part of paragraph 2 of the report, it would be observed that the Company now had a reserve of £16,250 on exchange equalization account, and that they had placed £1250 to the credit of that account during the past year. Prior to 1896, they had no such account; but the reduction in the value of the rupee led the Board to put aside something towards meeting the depreciation of the currency. In the early history of the Company, the rupee was worth more than 2s.—its par value. The accounts were rendered by calculating the rupee to represent 2s.; and the system had been continued. But before they established the exchange equalization account, exception could probably have been taken to the correctness of the balance-sheet—for instance, in the item "Amount due to the Company," which the shareholders would see stood at £20,127. If all this money were collected in Calcutta, and sent to England, instead of receiving £20,127 in London, they would, at the present rate of currency, receive only £13,400. In a going concern, all of this £20,127 would not, and could not, be sent home, as the whole sum was not profit, but only a portion of it; the greater part being wanted for the purchase of coal and for wages, in rupees, in Calcutta. However, the shareholders would see that full and ample provision was made in the exchange equalization account to meet the difference between the par value of the rupee and its current value. He mentioned this because the Auditors had very properly called his attention to the debts due to the Company being in rupees, and that the rupee had been converted into sterling value at the rate of 2s. per rupee—a system which could not be conveniently altered, and which was, he believed, universally adopted by gas companies trading abroad. Referring to the revenue account, the costs for producing gas and distributing it, and for the maintenance of works and mains, were practically the same as last year, and called for no remarks. On the credit side of the account, there was a reduction in the quantity of gas sold. In 1899-1900, they sold 228,159,000 cubic feet; whereas last year they sold only 225,864,000 cubic feet. The private consumption in 1899-1900 was 30·66 per cent. of the total sale; while last year it was 29·43 per cent. This was partly due to the floods referred to in the Directors' report, and partly to competition from the Electric Light Company. The gas rental was £1894 less than in the preceding year—amounting to 1d. per 1000 cubic feet on the quantity of gas sold, and due in part to the decreased private lighting, and in part to the reduction in the price charged for gas under the new public lighting contract during the months of May and June last. This reduction, he need hardly say, would be greater over the current twelve months; but there was every probability of an increase in the number of public lamps this year,

which might have the effect of bringing up the revenue for gas to that of 1899-1900. On the other hand, there was this year an improvement in the sale of residuals, equal to 6d. per ton on the cost of the coal, as compared with the previous year. During the past four years, there had been a steady diminution in the yield of gas from the coal, equal to 255 cubic feet per ton; but this was fully compensated by the reduced cost of coal, since 1897, of 4d. per ton; and the increased sale of residuals, equal to 3s. 6d. per ton. Their Manager in Calcutta (Mr. D. C. Niven) was a canny Scotsman, and looked not only at what quantity of gas the coal would make, but also at what the residuals would realize; and he went to market accordingly. Before putting the resolution for the adoption of the report, he might read an extract or two from the Manager's reports, in which he referred to the floods in Calcutta. In his report for September, 1900, he wrote: "Heavy rains, unexpected and disastrous, began on Tuesday night, Sept. 18, 1900. The streets on Thursday night were covered with water from 2½ to 4 feet deep. The gas-works were all right in Sealdah; but nearly half of the lamps were out for a night. The water on Sunday, Sept. 23, gradually receded. Many men—outside men and all indoor and outdoor departments—were engaged in pumping, and the lights were made all right. Howrah Gas-Works, from the high floods, were unable to make gas. The water was far above the fires, and thus extinguished them. Howrah Gas-Works were a large sheet of water like a lake. Everything was made all right as the water receded." Then, in his report for May last, speaking of mains relaid, he stated in regard to Tollygunge Bridge: "Relaid 68 lengths of 3-inch pipe. The foundations of the bridge sank, and the bridge fell during the heavy floods in September last. The bridge has been rebuilt." Then he adds in a footnote: "No gas was made at Howrah from Sept. 21 to Oct. 15, 1900, inclusive." Again in Mr. Niven's abstract of the gas accounts for June last, he said: "There is a decrease of Rs. 3259½ under private lighting (Calcutta), compared with the same month of the previous year. I find there is a decrease arising from the electric light of Rs. 1235; and from other causes Rs. 2024·8. For instance, the gun factory is Rs. 500 less this month through less work." To further show the seriousness of the floods, he might quote the following from the remarks of the Lieutenant-Governor upon the report of the Corporation of Calcutta for the year 1900-1: "The city suffered during the year from an abnormal rainfall of 87 inches, of which 45·55 inches fell in the month of September, 1900, against an average for that month of 10·18 inches. The floods in that month were, so far as is known, beyond all precedent; and the submersion of large areas of the town was followed by a sharp outbreak of cholera, and a marked increase of fever and bowel complaints." He (the Chairman) mentioned these matters to show the great extent to which Calcutta had suffered from the floods. He moved that the Directors' report and statement of accounts be received and adopted.

Mr. H. D. ELLIS seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. R. MILLER, a dividend of 8 per cent. for the year was declared, free of income-tax, payable on Dec. 4, less the interim payment of 3½ per cent. paid in June last.

Moved by the CHAIRMAN, and seconded by Mr. A. TENNENT EASTMAN, Mr. H. D. Ellis, one of the retiring Directors, was re-elected; and, with equal unanimity, the shareholders re elected Mr. W. Williams, on the motion of the CHAIRMAN, seconded by Mr. ELLIS.

Both gentlemen having responded,

Major POWNEY moved, and Mr. E. FELIX WHITE seconded, the reappointment of the Auditors (Mr. S. W. Savage and Mr. Frederick Seel); and this was agreed to.

With much cordiality, the shareholders thanked the Chairman and Directors, and the Manager, Assistant-Manager, Secretary, and staff generally in India and at home for their devoted services in the interests of the Company.

This concluded the proceedings.

NEW GAS-WORKS FOR ST. HELENS.

It was stated in the "JOURNAL" for the 8th ult. (p. 921) that the St. Helens Corporation had for some time past been considering the question of providing new gas-works, to enable the constantly increasing demands to be met; and that the Committee had resolved to apply to the Local Government Board for a Provisional Order to amend the St. Helens Corporation Act, 1893, and subsequent Local Acts and Provisional Orders Confirmation Acts, so as to empower the Corporation to erect gas-works, and manufacture and store gas and residual products, upon the lands to be acquired by them from the United Alkali Company, and to confer upon them borrowing and other powers with respect to the extension. It was under these circumstances that Colonel Luard, of the Local Government Board, attended last Thursday at the St. Helens Town Hall to hold an inquiry into the matter. The Town Clerk (Mr. G. W. Bailey), in explaining the scheme, said that, by the Act of 1891, the Corporation were authorized to borrow £350,000 for gas and other purposes; and £295,715 of this had been borrowed, and sanction gained for a further £11,478. By the Act of 1893, the Corporation were empowered to purchase lands not exceeding 12 acres in area, for the purpose of extending the gas undertaking. It did not seem to be quite clear, however, that under the Act new works could be built. If the Act did cover such erection, the Corporation could have borrowed the money with the sanction of the Local Government Board, without going to Parliament for a Provisional Order. The purchase of the site now in question would be completed in January next. The Corporation were going to pay a lump sum on the basis of £700 an acre for the freehold; while the part which was leasehold would be taken over at the same rent as had hitherto been paid for it. Altogether £5397 would be paid for the freehold. The land had a considerable extent of railway siding; and certain buildings and a chimney had to be taken at a valuation, which was fixed at £800. Notices had been sent to the 508 people who lived within the 300 yards radius; and not a single objection had been received. In drawing attention to the increase in the use of gas at St. Helens, the Town Clerk said that in 1880 the consumption was 111 million cubic feet, in 1890 it was 186 millions, in 1897 it was 256 millions, and in 1900 it was 327 millions—having thus practically trebled itself in twenty years The price averaged 2s. 4d. per 1000 cubic feet. The Gas Engineer (Mr. S. Glover) went into the details of the proposal. The present works, he said, covered 5½ acres; and the retorts were capable of producing 2 million cubic feet of gas per day. They were now making 1½ million feet daily, and during the winter the quantity would be a quarter-of-a-million more; so that the margin would be dangerously small. The present works could not be extended; and the new site was the nearest that could be obtained. It offered exceptional facilities. The inquiry closed without any opposition being offered.

LOANS FOR GAS PURPOSES AT KEIGHLEY.

IN connection with an application by the Keighley Corporation to the Local Government Board for sanction to borrow three sums amounting in all to £24,779 for gas works purposes, an inquiry was held by Colonel A. J. Hepper last Friday. From the statements by the Corporation officials, it appeared that the application was made in respect of £1022 excess of expenditure over borrowing powers in the five years ended June 30, 1898, caused by the outlay on prepayment meters; £10,257 spent on mains, service-pipes, prepayment meters, and cookers in the two years ended June 30, 1900; £10,000 estimated to be required during the two years ending June 30, 1902; and £3500 for new offices, show-rooms, workshops, and stores in Cooke Lane. The present debt on the gas-works is £89,349 15s. 11d. Asked why the Corporation had not applied for a loan before now, Mr. John Laycock, the Gas Engineer, informed the Inspector that they had been expecting that they could sell the Low Bridge site to the Electrical Department. But the Local Government Board would not sanction the sale; and the site had been let to the Electrical Department at a rental. The Inspector inquired if the building in Cooke Lane had been commenced. Mr. Laycock replied that it had, whereupon the Inspector asked why the Committee did not wait till they could get sanction? Mr. Laycock answered that the Committee seemed quite certain that the Local Government Board would sanction the scheme. The Inspector: You should not "count your chickens before they are hatched." Mr. Laycock rejoined that the tenders were extremely low; and that the Committee had given an undertaking to clear the Cooke Lane site within a certain period, and throw a certain portion into the road. In further reply to the Inspector, he said the gas-works paid exceedingly well. He had not a statement of the profits; but they had been able to hand over a considerable amount—about £3000 or £4000 a year—to the rates. They had also built up a floating capital account, and established a sinking fund. After hearing the Corporation case, the Inspector asked if anyone wished to oppose. Mr. W. Driver, the President of the Ratepayers' Association, responded; and his curious contention was that this application would eventually lead to a further increase in the rates, inasmuch as the town possesses an electrical installation. He seemed to be impressed with the idea that electricity would supersede gas as a motive power. The most sensible part of his opposition was where he objected to the system of seeking sanction to the borrowing of money after it had been spent. Mr. Laycock pointed out that the cost of electrical power was about 4d., against ½d. for gas power; so that there was no fear of electricity superseding gas. It took about 1⅓ units of electricity for 1-horse power at 3d. per unit, against 14 cubic feet of gas for 1-horse power at a cost of ½d. Mr. Laycock mentioned that the gross gas profits last year were £11,094, and that until the Corporation decided to apply the gas profits to the relief of the rates some years ago, they used to make one generation pay for the next. Mr. Laycock added that he estimated the value of the gas-works at £200,000, while the debt only amounted to £90,000. The proceedings closed with a vote of thanks to the Inspector.

GAS POISONING FATALITY IN DUBLIN.

An inquiry was held by the Dublin City Coroner (Dr. Louis Byrne) on Monday of last week, into the death of James Clarke, which took place at his residence in Eccles Place on the previous day. Dr. C. Sullivan, House Surgeon of the Mater Hospital, gave it as his opinion that death was due to poisoning by carbon monoxide gas, accelerated by cardiac weakness. From the evidence, it appeared that the gas-main opposite the house (which was laid at a depth of 18 inches) was broken, and that the presence of the gas in the building must have been due to percolation through the ground. There was no gas in the main sewer; and the cross-drain connections were in proper order. A constable, on proceeding to the house, found that deceased was unable to stand on his feet, and could give no collected account of himself or of what had happened. There was no ventilation whatever in the place. Alderman Doyle, who was present at the inquest, said he thought there should be supervision of the gas-mains the same as there was of the water-mains, and that expert evidence ought to be taken as to the quality of the "obnoxious gas." The Jury returned a verdict in accordance with the medical testimony, and added a rider to the effect that, in their opinion, the broken main was defective and not properly laid; and they strongly condemned its being so near the surface.

Increased Storage at the Boroughbridge Gas-Works.—It has been apparent for some time to the Directors of the Boroughbridge Gas Company that the storage at their works was inadequate; and they therefore instructed Messrs. J. F. Blakeley and Co., of Thornhill Lees, to erect a holder, which the firm have just completed under the supervision of the Company's Manager, Mr. G. Calvert. It is 40 feet in diameter and 16 feet deep, and will contain 20,000 cubic feet of gas. It was recently brought into use by Mr. Bacon, the Chairman of the Company, turning the gas into the mains, of which 300 or 400 yards have been newly laid. This holder, with the smaller one on the works, will be ample to meet the present consumption.

ELECTRIC LIGHTING NOTES.

By a large majority, the Camberwell Borough Council last Wednesday decided to supply electricity for public and private purposes within the borough. It was resolved to purchase the existing rights of the London Electric Supply Corporation, Limited, for £25,000.

Great amusement was caused at the Luton Town Council meeting last Tuesday by the sudden failure of the electric light in the Council Chamber, just as the Deputy-Mayor was speaking on the subject of Mond gas. The room was in darkness for several minutes, and members struck matches until some one could be found to turn on the gas. Meanwhile, the Chairman of the Electric Lighting Committee went on a voyage of discovery, and, after 40 minutes, the electric light again appeared. It was explained that a fuse had failed in connection with the Town Hall wiring, and that there was nothing wrong with the station. A councillor urged the necessity of keeping the gas service always ready for emergency in public buildings, as such a mishap as the one just experienced might cause a panic in a large gathering.

On Monday night last week the electric light suddenly went out at Bath. The breakdown was of a general character, affecting both private and public lighting. For an hour-and-a-half neither was available; but by degrees certain sections of both were reinstated. Great inconvenience was caused, but no injury occurred to anyone at the electric light works, although considerable risk was run by the workmen, who were busily employed all night in trying to remedy the defects. It is stated that these were in connection with the switchboards and flaws in the old cables; and this was the nature of the explanation given at the meeting of the Town Council on Tuesday morning, when considerable discussion took place upon the report presented by the Electric Lighting Committee, which referred to a previous temporary breakdown. The Chairman of the Committee (Alderman Taylor) assured the meeting that early that afternoon the light would be in its usual condition; but this prophecy was not verified, for at five o'clock, when the arc lights should have been in full glow, the streets relying on them for illumination were in darkness, while incandescent lights in many private establishments were useless. At the Pump-Room, the orchestral concert had to be brought to a premature conclusion; and in the Police Court candles had to be employed to provide the necessary light. Private lighting was obtained on some circuits early in the evening; but later on the arc lamps were still out.

It must be admitted that those responsible for the public lighting of Erith are of a somewhat changeable turn of mind. For some years, the streets were lighted by means of gas by the West Kent Company; but in 1888 the Council carried out a scheme of oil lighting, which has been in operation ever since. Now, however, it is proposed to substitute for this primitive arrangement an up-to-date electric light installation; and on Tuesday last Mr. H. H. Law, M.Inst.C.E., attended on behalf of the Local Government Board to hold an inquiry into the application by the Council for sanction to borrow £23,506 for the purpose. The cost of the scheme, as estimated by Mr. Hawtayne, who is advising the Council in the matter, will be £18,706. It was stated at the inquiry that the principal demand would be for the lighting of the streets. The large works in the district were to a great extent provided with their own electric plant already; but no doubt some of them would (if the cost was reasonable) take current from the Council for extensions and for occasional use. It was expected that the light would be supplied at less than 6d. per unit. The proposal has aroused strong local opposition; and the inquiry has been adjourned until the 10th prox., when Mr. Hawtayne will be examined, and evidence will be given on behalf of the opponents. From the long account which appears in the local Press, it would seem that last Tuesday's proceedings were devoted more to an attack upon the Gas Company than to setting forth the advantages that will accrue to the ratepayers from the spending of £23,506 of their money. On the night previous to the inquiry, the Erith Tradesmen's Association held a meeting, at which a resolution was passed protesting against the adoption of the scheme, on the ground that it would undoubtedly entail a heavy charge on the rates, and that it was not the most economical way of improving the lighting of the district. The Chairman (Mr. Harry Palmer), in the course of the proceedings, remarked that 6d. per unit, which it was proposed to charge, worked out at something like 7s. 6d. or 8s. per 1000 cubic feet of gas. This is hardly what the electricians would contend; but if any one doubts the correctness of the assertion, let him adopt electric lighting, and he will see.

A Local Government Board inquiry was held at Rotherham last Wednesday, by Mr. A. A. G. Malet, Assoc.M.Inst.C.E., into the proposal of the Corporation to borrow £12,000 wherewith to extend their electric lighting plant. The Town Clerk explained that in 1900 the Board sanctioned a loan of £26,910 for electric lighting. Out of this sum, the generating station had been erected, and engines, dynamos, batteries, switchboards, and condensing machinery provided. About 1820 yards of feeders, and 5000 yards of distributing mains, had been laid. Special arc light leads had also been laid for supplying about 35 street-lamps. The machinery, mains, &c., were capable of furnishing 7280 8-candle power lamps. The works were opened on May 23 last, with eight consumers and an equivalent of 295 8-candle lamps. The progress since made had been eminently satisfactory; and the Council had already been compelled to take into consideration the question of extensions of mains and plant. At the present time there were 110 consumers connected, with an equivalent of 6527 8-candle power lamps; and there were additional applications which would bring the total number of consumers to 126, equal to 7811 8-candle lamps. It was estimated that at the end of the financial year to March 25, 1902, the number of consumers would be 160, equalling 10,000 8-candle lamps—that was to say, about double the amount estimated in the first instance. Up to the present no mains had been laid in the Masborough part of the borough, although there had been many inquiries as to the light being taken there. The money was required for the following purposes: Extensions of generating plant, £3337; feeders and mains to Masborough, £2150; extensions and mains in Rotherham, £1300; street lighting, £600; service cables, £700; meters, £600; and extras, £313. The Town Clerk said that the Corporation originally had not anticipated there would be so great a demand for the electric light. To this the Inspector replied that that was always the way. He did not know of a single instance where the first installation had been sufficient for after years. It was a pity that corporations were not bold enough to begin their installations with sufficient provision, as it was more expensive afterwards to make additions. However, it was satisfactory, so far as Rotherham was concerned, that they had covered their expenditure in the first year. The Town Clerk, in answer to further questions, said the Corporation had obtained statutory powers. They had demands for electric light which would necessitate going far beyond the original plans. Their area extended to the limits of the borough; but they had no powers outside. The applications for electric light now submitted were those that must be met under their obligations.

Last Tuesday Mr. A. A. G. Malet, Assoc.M.Inst.C.E., held an inquiry, on behalf of the Local Government Board, into the application of the Sheffield City Council for sanction to borrow £500,000 for the purposes of their electric lighting undertaking. The Town Clerk stated that the application had been rendered necessary by the extraordinary extension of the business. The demand for electricity was rapidly overtaking the supply; and it was necessary to establish new works. At the present station there was absolutely no room for additional machinery; and if one of the large engines broke down, some of the circuits would be without current. To indicate the progress of the business, he quoted figures showing that in 1893, when the Company were in possession, the number of units supplied was 131,000; in 1897, when the Company still owned the undertaking, 747,000 units were supplied; in 1898, the first year of the Corporation management, the figure was 978,000 units; and for the fifteen months ending March 25 last, there were used 2,381,000 units. They had now 1616 consumers connected; and 90 more were waiting. Consequent on the growing demand, the Corporation found it absolutely necessary to secure a site for a new power station; and they had accordingly purchased some 10 acres of land on the north side of the city, at an average cost of about £400 an acre. The site was considered to be admirably adapted for the purpose; being bounded on one side by the Great Central Railway, which would be convenient for the supply of coal, and on another side by a goyt from the River Don, which would give them a perpetual supply of water. They had gone some little way from the centre of the city, because the land was cheaper. The new station would contain three 1500-kilowatt alternator sets, and a spare boiler. Each boiler would be of about 1500-horse power; so that the total capacity of the plant would be 6000-horse power. The sum of £500,000, it was stated, was made up of about £136,000 for extensions of plant at the present station in Sheaf Street, and for extensions of mains. The new works at Neepsend were roughly estimated to involve an expenditure of £238,000, including £4000 odd for the site, and £60,000 for three 1500-kilowatt alternator sets, condensers, switchboard, railway sidings, boilers, workshops, &c. A further item of £10,500 was the estimated cost of the projected arc lighting scheme for 100 lamps, to be placed in the principal streets. For contingencies, £31,000 was allowed; and a sum of £83,000 was allowed to cover expenditure already incurred since the last loan in extending and improving the undertaking. The present plant was equal to supplying between 60 and 70 per cent. of the connected lamps. In reply to a question, the Inspector said that the periods allowed for repayment of the loan would probably be: As to the land, 50 years; buildings, mains, and cables, 30 years; and machinery, 15 years. The inquiry then closed; and the Inspector visited the works in Sheaf Street and the site of the new station at Neepsend.

A special meeting of the Norwich Town Council was held a few days ago to receive a report from the Executive Committee respecting the proposed purchase by agreement of the undertaking of the Norwich Electricity Company, Limited. The Committee had provisionally agreed that the consideration to be paid by the Corporation for the concern should be a sum equivalent to £19 per share on all share capital issued by the Company; a sum of £5000 to be paid to the Directors as compensation and remuneration for carrying on the undertaking until the Royal Assent is given to the Bill to be applied for by the Corporation; and a further sum of £2000 towards making up back-dividends to shareholders. They now recommended the Corporation to confirm the agreement. Mr. W. C. C. Hawtayne had reported on the matter, in conjunction with Messrs. Price, Waterhouse, and Co.; and he expressed the confident opinion that the Corporation would be studying the best interests of the ratepayers if they acquired the undertaking and worked it for the benefit of the community. The firm named estimated the net revenue for the year 1891-2, with a progressive increase of 10 per cent., at £11,253, against which there would have to be charged £8534; leaving a balance of £2719, subject to depreciation. For the following year they reckoned the revenue would be £12,378, against which there would be an estimated annual charge of 5¾ per cent. for interest and sinking fund, amounting to £12,232; leaving a surplus of £146, but subject to such further provision for depreciation as might be necessary. Mr. Cunnell having moved the adoption of the report, Mr. Mallett criticized the proposal, and characterized the purchase of the electric light works at the price named as a suicidal act on the part of the Corporation. The shares of the Company had, he said, been bought a short time since for £15 and £17 apiece; and why the Corporation should now offer £19 for them was beyond his comprehension. The concern had been a success for only six or eight years; and he could not understand why the Company should be given a profit of £70,000. He did not believe the business of the Company would increase in the ratio that had been stated; for incandescent gas-lights were to a large extent taking the place of electricity. Then again there was the Mond gas, which in the next ten years would replace electricity as a motive power. He believed if the Corporation acquired the electric light undertaking it would involve a charge upon the rates of at least £2000 a year for the next fifteen years; and nothing that anyone could show him would alter his opinion. Mr. Havers remarked that Mr. Hawtayne had told the Committee that no other recent purchase of the kind had been concluded on terms so favourable as theirs. Mr. Mallett said he was sorry for the rest. Mr. Scarles acknowledged that the Corporation would pay a very high price for the property; but he nevertheless thought their proposed action would be amply justified. After some further remarks, Mr. Cunnell, replying on the discussion, said that Liverpool paid £400,000 for a concern of which the capital

was £230,000; Leeds paid £220 for each £100; Birmingham, £220 for each £100; and Eastbourne, £20 for each £10. He thought the price to be paid by Norwich compared very favourably with these figures. He did not believe there would be the charge upon the rates which had been anticipated; and he considered the terms of purchase were fair as between the Company and the Corporation. The motion was then put and carried—42 voting for and one (Mr. Mallett) against it. The Town Clerk was then instructed to take the necessary steps for obtaining parliamentary sanction to the purchase.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held on Tuesday last, at the Offices, Marylebone Road, under the presidency of Mr. EDMUND BOULNOIS, M.P.

The SECRETARY (Mr. F. H. Wybroo) read the notice calling the meeting, and also the report of the Auditors, which stated that the capital of the Company was £1,938,523, including £55,494 received this half year, and that the total expenditure on works amounted to £1,931,855, including £41,521 expended in the half year. The revenue for the six months ended Michaelmas last was £150,398, showing an increase of £4432 as compared with that of the corresponding period of last year, exclusive of £2362 due for water supplied to the East London Company. The balance to the credit of the dividend and interest account was £59,132.

The CHAIRMAN, in proposing the adoption of the report and accounts, congratulated the proprietors on the continued success of the undertaking. It was satisfactory to know, from the Engineer's report, that all the works had been maintained in a thoroughly efficient condition. The new 42-inch main from Hampton to Barnes had been brought into use, and had proved of immense value in the past half year, as it had enabled the reservoir at Barn Elms to be kept full. The number of supplies laid on in the six months was 859, making a total of 87,736, to all of which a constant service had been given. The Directors, in their report, referred to the intercommunication scheme at present in existence, and to the one which the Companies had been called upon by the Local Government Board to carry out under the Act passed last year. Their Company, with the other Companies, were able to supply the East London Company, under the present scheme, with a considerable quantity of water during the summer, thus enabling the Company to keep their reservoirs sufficiently full to prevent the possibility of anything like a deficiency of water to the consumers. He asked the proprietors to compare the state of London last summer, while the drought of previous years continued almost in an aggravated form, with that of some of the largest towns in the Provinces. For instance, they read of a literal water famine in Leeds, Bradford, Halifax, Huddersfield, Manchester, Edinburgh, and a score or more of lesser towns in the North; whereas the people of London did not suffer the slightest inconvenience for a single hour. He was justified, in fact, in saying that they were supplied just as if the rainfall made no difference at all. He might observe that in the towns he had mentioned the water supply was under municipal management and control. He thought the comparison which the public would be inclined to make in connection with this matter would not be unfavourable to the London Water Companies. The Directors also stated that it was anticipated that the Government would introduce a Bill next session dealing with the water question; and this statement was confirmed by the speech made on the previous night by the President of the Local Government Board. He listened with great attention to Mr. Long's speech; and he was glad to learn—what, however, he had felt perfectly sure of before the right hon. gentleman said so—that if the undertakings of the Companies were to be purchased, they would be taken over on the usual terms which were recognized for compulsory sale. They must, of course, wait for the details of the Bill, before they could criticize it or form any opinion; but meantime he could assure the proprietors that when the measure came before the Directors they would, as far as possible, endeavour to protect the Company's interests, and see that their valuable property did not suffer at the hands of those who wanted to take it from them. Alongside the Government Bill, once again came the measure brought forward by the London County Council, which he presumed would differ in no respect from all its predecessors, which had received such decisive treatment at the hands of the House of Commons. He thought he might venture to predict that the County Council's Bill next session would receive similar treatment from that body. In any case, the Companies need not be apprehensive about the Bill, which, in his opinion, was purely political, and brought in by the Progressives for vote catching purposes. But he would like to say that, in his opinion, the purchase of the undertakings, whether by a Board such as that which was sketched out on the previous evening by Mr. Long, or whether by the County Council or any other body, was not justifiable. If it could be shown that the Companies had not done their duty in the past, or if it could be proved that water could be supplied cheaper than it was at present, there might be some reason for making the change; but they had the authority of the latest Royal Commission, which was confirmed on the previous evening by the President of the Local Government Board, for saying that they had carried out their duties satisfactorily, and no one who understood the subject would for a moment say that the water charges in the Metropolis could be reduced except at the expense of the public rates. Personally, he believed that sentiment and fancy were at the bottom of the whole thing—sentiment and fancy which had been fostered and fanned by the County Council for political purposes—and that Londoners were by no means enthusiastic or eager, as had been stated, to make any change. Dealing with the accounts, he said that, although there had been an improvement in the water-rental, there had been a heavy increase in the charges on the other side. Compared with the corresponding period of 1900, there had been increases in the rates of £2260, in the cost of coal of £6000, in parliamentary and law charges of about £1300, in charges for the Staines reservoirs of £3500, in the payment to the Chamberlain of £3500, and in interest on debenture stock £3200. These were all large figures; and he might state that the total increase in the past four years under these heads, including wages also, had been no less than £41,000. The law and parliamentary expenses seemed to be a considerable sum; but certain Tramway Bills last session had to be opposed on account of the action of the electric current upon the mains, and he was glad to state that they were successful in obtaining some protective clauses. The amount paid to the Chamberlain's fund would naturally continue to grow as the capital of the Company increased. By the Act of Parliament, they had to pay to the Chamberlain annually on all new capital raised since 1894 a sum equal to the difference between the interest paid on the new capital and the average dividend or interest paid on all the capital, less 1 per cent. for management. He did not know if the proprietors understood this clearly; and he might therefore say that, supposing the average dividend to be 7 per cent., and the interest paid on the new capital to be 3 per cent., a payment equal to 3 per cent. on the new stock had to be made. This payment was imposed upon the Company to prevent the holders of old stock from obtaining any advantage from the issue of new capital, and on the assumption that all new capital would earn the same revenue as the old. But this assumption was fallacious, as a considerable part of the expenditure in recent years had been incurred in providing a greater reserve of storage capacity, which the Company had done at Barn Elms and Staines. Such works did not add anything to their revenue. On the contrary, they entailed charges for maintenance, and were heavily rated; and the payment to the Chamberlain on their cost was felt to be unfairly burdensome. Of course, the gross rental had increased in the years he had enumerated, but not sufficiently to meet the additional expenditure; and it had therefore become necessary to give notice to the various authorities in their district that, after Christmas next, the rebate of 10 per cent. which had been allowed to all customers since 1894, would be reduced to 5 per cent. It could not be fairly said that they themselves were in any way responsible for this, because he found that the borough rates paid by the Company in 1887, when the rebate of 5 per cent. was first commenced, were £15,915, and that they had increased in the interval to £32,000; while at the same time they had to pay to the Chamberlain's fund £7650. This made a total advance since 1887 of £24,000. Had it not been for careful management and control, the rebate would have had to be reduced sooner. The Directors of the London Water Companies received no credit for foresight and good management. It might be said that in the last few years the Companies had spent millions on reservoirs, filter-beds, and mains, which brought in no return, but which were an insurance to the consumers. Although, however, the Companies had been opposed at every point by the County Council, and although Parliament had chosen to place upon them obligations and burdens which no other industrial undertaking in the country had to bear, yet he believed they had done their duty, and that they deserved well of the community. No Board of Directors were better served than his colleagues and himself by Mr. Wybroo, Mr. Hervey (the Engineer), and their staffs.

The DEPUTY CHAIRMAN (Mr. Jackson Hunt) seconded the motion, which was carried unanimously.

Resolutions were afterwards passed declaring a dividend on the consolidated stock for the half year ended Sept. 30 last at the rate of 10 per cent. per annum, tax free, and thanking the Chairman and Directors for their able and satisfactory management of affairs.

MR. LONG ON THE LONDON WATER QUESTION.

The President of the Local Government Board (Mr. Walter Long) was the guest of Mr. W. F. D. Smith, M.P., the Vice-President of the National Union of Conservative and Constitutional Associations, at a dinner at the Hôtel Métropole on Monday last week. There was a large and representative company, which included several Mayors of Metropolitan Boroughs, Metropolitan Members of Parliament, and members of parochial and other bodies. The loyal toasts having been duly honoured, Mr. Smith proposed "His Majesty's Government." In the course of his remarks, he said there was one subject about which they wished to hear something that evening from Mr. Long—a subject which was made familiar by the reports of various Royal Commissions, and from that hardy annual which was introduced by the County Council with a persistence worthy of a better cause—namely, the water supply of London. That question was still with them, but he had very strong hopes that before the end of next session was reached it would have ceased to exist, and that the County Council might be spared the trouble, and the ratepayers of London the expense, of introducing any more Bills to solve the problem. He did not say for a moment that Mr. Long's task would be an easy one. On the contrary, he believed it would be difficult and complicated. Many interests had to be considered, and no doubt a certain amount of compromise was necessary. But he thought that what they all ought to get fixed in their minds was that no half-heartedness was possible. If the subject was to be settled, it could only be settled by the hearty support of the Unionist members of Parliament and of their followers outside. He coupled the toast with the name of Mr. Long.

In responding to the toast, Mr. Long expressed the belief that the only solution of the future local government of London was to be found in dividing the duties between the central body and the local bodies, and then laying on the shoulders of a representative body of both of these bodies works which must be shared by all, and could not be borne by one. This sentiment meant the adoption of the principle of indirect representation. Their Radical friends would ask: "Do you think anyone will stand in London the rating of London by a body not popularly elected?" He left it to those present, who knew something of the government of London, to ask whether there were not already examples of taxation, for very important purposes of local government, by bodies which were already indirectly elected—for purposes which were of the utmost value and importance to London. He believed the question to which the Chairman had referred would have to be solved upon those lines. In regard to the management of the water supply of London, they must take care that the whole of the area concerned was represented. Were they not

going to benefit by the experience they had gained, and the knowledge they had acquired, of what local government had meant in the past, and what it meant now? Did they not realize that it was essential that there should be an efficient and sufficient supply of water to the people of the Metropolis? Did they not realize that if the London Water Companies were to be bought out—not for any sins of their own, but because it was policy—they should be bought out upon fair terms, fair to them and to the ratepayers of London and the Outer London which might have to pay the bill hereafter? If they really held these opinions, he was confident that the Bill which he would have the honour to ask the House of Commons to pass in the coming session would meet the views of the Unionist party. In his studies of the London Water Question, he had not found that it had added much to the reputation of any Minister; but he could only say that he would not seek any personal advantage, or any advantage to the party to which he belonged, in the settlement of that great question. He believed it was one intimately connected with the daily life, the happiness, and even the Christianity of the people of London; because if people were obliged to lead dirty lives, they could not be expected to lead Christian lives The Water Companies of London had done their level best to supply water to the Metropolis when nobody else was ready to do it; and he did not believe that public opinion would stand the confiscation of rights which were properly held, and had been exercised for the benefit of the community as a whole. The Bill which he would introduce next session was one which would seek to constitute a body representing the whole area which was affected by the London Water Question, which would give a preponderance to London as a whole, not the London of the County Council. It would vest in the new authority those properties, so that it must manage them by a stated time, which would leave the purchase of those properties to a fair and open arbitration of a competent, even a distinguished, kind, and which would also give to the new authority full powers to do that which might be necessary in the interests of Water London as a whole. If these proposals were rejected, it would be either because the supporters of the Unionist party were not content to accept the policy of the Government, or because their opponents would be able to convince their supporters that before they dared to deal with any question of local government in London, they must take care that the individuals concerned in its adminstration had been popularly elected for the particular purpose. He looked forward with confidence to the energetic assistance of the Conservative members of Parliament in the coming session, and assured them that the policy of the Government was founded on justice to all concerned, and was so conceived as to give to London in connection with the great Water Question, a system of administration which would have the opportunity to manage things to the advantage of Londoners, and which would not find it necessary to seek for popular applause, or to advocate confiscation or robbery as a claim on the affections of the electors.

The toast of "The Metropolitan Division of the National Union of Conservative and Constitutional Associations" was proposed by Mr. Hayes Fisher, M.P., who said they were content to regard Mr. Long as their friend, and to believe that he was anxious to give them a practical solution of the great question of the London Water Supply. Sir G. Farde l, M.P. (Chairman of the Division), responded, and the proceedings then closed.

TEIGNMOUTH WATER SUPPLY.

The Torquay Offer Accepted.

The question of the water supply of Teignmouth was apparently finally determined yesterday week, when the District Council again met, and, after considering some alternative suggestions, decided to accept the principle of the Torquay Town Council's offer of a supply, subject to the arranging of details and to the Corporation undertaking to commence furnishing the water in twelve months. Mr. Harris, the Chairman of the Water Committee, and Colonel Morrison, the Chairman of the Council, spoke and voted against the resolution. Their objection to the scheme was that, while it would take £27,307 to pay off the existing debt on the water-works, which will be liquidated by 1934, the Torquay Corporation will in these 34 years really take £44,064 from Teignmouth on this account, even if the rateable value should not increase. Reference was made to another scheme which had been discussed in Committee, under which no guarantee would have been necessary, and a 2s. rate would have covered everything. This was understood to refer to an offer from the Paignton District Council. The weak point about this proposal, remarked the Chairman, was that no definite time was mentioned for letting the town have water; and time was everything under present conditions. Mr. Slocombe (now one of the supporters of the Torquay scheme) admitted that the other proposal would save £17,000, but contended that, while they were saving this sum, they would run the risk of damaging the town by hundreds of thousands of pounds.

Lighting Private Streets at Falmouth.—The question of the liability of the town to light private streets, was under the consideration of the Falmouth Town Council at their last meeting. A petition for lamps was presented by the residents in two streets which are not lighted, on the ground that, as ratepayers, they were entitled to this convenience. The Lighting Committee recommended that the owners of the houses should be called upon to provide proper means of lighting, and that in default the Corporation should carry it out under the Private Street Works Act. The Mayor (Dr. Banks) said the Council had decided that they were no more responsible for the lighting of private streets than they were for channeling and kerbing them. The whole of such work should be done by the owners before the houses were handed over to the public authority. Mr. H. L. Owen suggested that the lighting of the town generally ought to be improved. The Town Clerk said it was the duty of the Corporation to effectually light the town, without waiting for a petition, and to place the responsibility upon the people concerned. Mr. Buckley thought a great deal of ill-feeling would be saved if the legal machinery in relation to private streets were set in motion before houses were occupied or rates collected. It was decided to carry out the recommendations of the Committee.

RATING OF THE GRAND JUNCTION WATER-WORKS.

The Company's Valuation Appeal.

Saturday, Nov. 16.

To-day the inquiry was resumed (*ante*, pp. 1049, 1328) by Mr. Ernest Page, K.C., into the value of those portions of the undertaking of the Grand Junction Water Company which are situate within the parishes of St. James's, Westminster, Marylebone, Paddington, St. Margaret and St. John, Westminster, and St. George's, Hanover Square. The Company had appealed to the Clerkenwell Sessions against the assessments of these parishes; and the matter was referred to Mr. Page to make a valuation.

Mr. Balfour Browne, K.C., Mr. Boyle, K.C., and Mr. Snagge represented the Company; Mr. F. Marshall, K.C., and Mr. Dighton Pollock appeared for St. James's, Westminster; Mr. English Harrison, K.C., and Mr. Russel Griffiths for Marylebone; Mr. Danckwerts, K.C., and Mr. Glen for Paddington; Mr. Danckwerts and Mr. W. C. Ryde for St. George's, Hanover Square; and Mr. Ryde for St. Margaret and St. John, Westminster.

Mr. *Eve* was recalled, and produced certain tables dealing with the parishes of St. George's, Hanover Square, Marylebone, and Paddington, upon which he was cross-examined by Mr. Balfour Browne.

This closed the evidence.

Mr. Danckwerts, in a lengthy argument, contended, in the first place, that the Arbitrator had not to deal, in deciding the matter before him, with any questions of common practice, as had been suggested. He was strictly bound by the provisions contained in the Parochial Assessment Act of George III., and by the Valuation (Metropolis) Act of 1869. The tenancy must be treated as a hypothetical one. Throughout the case, he had noticed a tendency on the part of the appellants to dwell upon things being impossible in practice; and it had also been suggested that the tenant and the landlord would have to accommodate each other. Such arguments really excluded the hypothesis which, by the statute, the Arbitrator was bound to make. The contention that it must be assumed that the tenant and landlord would make reasonable terms with each other, and that this must have a bearing upon the figures all round which were to be fixed by the Arbitrator, was absolutely erroneous, and contrary to the statute. Further, if speculations of this sort were permitted, imagination could run riot, and one would have no single uniform standard upon which everybody was assessed—no hard-and-fast terms of tenancy according to which rates were to be paid—and the course intended to be adopted by the Acts he had mentioned, was immediately abrogated. He held it all the more necessary to call attention to this aspect of the case, because, in the first instance, the assessments had to be made by the Overseers of the Poor, and they were then finally fixed by the Assessment Committees. It was only in the minority of cases that one could, by investigation, ascertain the data upon which they had proceeded. Counsel then dealt with another point; contending that an annual tenancy at an annual rent implied the stipulation that the rent should be paid at the end of the year, and not quarterly or half yearly. The Company, in regard to the hypothetical tenancy, had proceeded on the latter basis; and therefore their figures ought to be corrected to this extent. If tenants were assessed, some on the basis of a half-yearly, and others on a quarterly payment of rent, and others, again, upon a yearly payment, there would be no uniformity whatever. Counsel cited several cases in support of his argument. He then proceeded to deal with the division between landlord and tenant with regard to what constituted landlord's and tenant's plant, and upon whom the burden of the repairs fell with reference to certain items. Continuing, he contended that the valuations which had been presented by Mr. Marshall, Mr. Hunter, and Mr. Jones were all vitiated by the fact that they had not accepted the hypothesis which the statute imposed.

The Arbitrator said that what was argued on behalf of the Company, irrespective altogether of maintenance and renewal, was that the pipes, when macadam had been replaced by wood or asphalte, had become pipes which would have cost the landlord more than, in fact, they did cost. The question was, should the landlord be entitled to anything more than a fair return upon the money he spent, because somebody else had made the hereditament more valuable.

Mr. Danckwerts intimated that he would reply to that point at a subsequent stage. As to the question of the frost, he submitted that it was really the landlord's fault that the mains were injured, inasmuch as they had not in the beginning been properly laid. If they had been, the damage would not have been done. The expenditure incurred the Company had chosen to take partly out of revenue, although it was in fact a capital outlay.

The Arbitrator: They said they were advised to do so.

Mr. Danckwerts contended that the matter was one which the Arbitrator should banish from his mind for the purpose of the appeal.

At three o'clock, the learned Counsel postponed further argument, in order that Mr. Ryde should address the Court.

Mr. W. C. Ryde (representing St. George's, Hanover Square, and St. Margaret and St. John, Westminster) said the latter parish, upon which he would speak, was a small one. The whole of the Company's hereditament was exactly the same in 1895 as it was at the present time, and was then rated at £109. In 1900, the Overseers increased this to £122. There was no appeal in 1895 against the rating, though the Company did appeal against other parishes; and since that time the net receipts had increased. It had been suggested that the appeal in the other parishes was a settlement, and not a judicial decision. This was true; but it was settled on the terms that the appellants should pay the respondents' costs. It was obvious, from general experience, that if the appellants were willing to do this, they obtained a much lower assessment than a mere half-way compromise. Therefore the Arbitrator should not wholly disregard the figure arrived at. As in St. Margaret's there was no appeal, the figure was considered favourable by the Company; and yet now they asked for a reduction in rateable value to £60, while Mr. Marshall had said it should be as low as £38. At first sight,

it looked as if the new Act, under which the Company would have to supply water to other Companies at a loss, was against the respondents; but the money so received was not the sole consideration. The other Companies would have to reciprocate on the same terms, should occasion arise.

Monday, Nov. 18.

Mr. DANCKWERTS resumed his speech this morning. After making an exhaustive comparison of the valuations of the witnesses on either side, he said that in 1890 the Company's undertaking in Paddington was rated at £12,340. In 1895, the rating was raised to £12,648; but on appeal, on condition that the Company should pay costs, it was reduced to £12,345—the assessment of 1890, *plus* £5. It had now been raised to £13,454—the very small difference of £1109. In St. George's, Hanover Square, the rating in 1890 was £9100; and this had remained the same. The Overseers had increased the rate; but the Assessment Committee put it back. Since then, the mains had been increased; and yet the Company appealed against the rating. They claimed a reduction in Paddington to £8384, and in St. George's to £6397; and this notwithstanding that the receipts in both parishes had increased. Counsel could see no ground, in face of the fact that mains had been added to and receipts augmented, for any appeal by the Company. Indeed, some of the items given by the Company's witnesses were in favour of the parishes; and on this point he maintained that he was at liberty to take his opponents' figures. However, the parishes did not wish to raise the rating now; they would be satisfied with the Arbitrator saying simply that the value of the concern justified them in their assessment.

The ARBITRATOR said he intended, should he so find, to tell the Court in his report that, having valued the premises, he had ascertained that the gross and rateable values were not less than those in the rating-books. If the Court required further information, they could ask for it.

Mr. ENGLISH HARRISON next addressed the Arbitrator for Marylebone; stating that in 1890 the rateable value in the parish was put at £1438, and continued without change or objection until 1900, when the Company appealed. The water-rents in the former year amounted to £7035; and in 1900 they had increased to £7498—a rise of £463 from the time of the original assessment. Yet the Company appealed. In regard to the withdrawing from Marylebone of the 24-inch main, Counsel submitted that there ought to be some special statement made by the Arbitrator in his report to the Court, because it might have some material bearing on the question of costs and with reference to the percentage that might be arrived at for the rating of the Company in Marylebone.

Mr. MARSHALL, in summing up for the various parishes represented by him, contended that the appellants, in allowing 7½ months on the total expenses of the year for tenants' capital, were setting aside much more than would possibly be required. He considered four months was ample. In regard to the increased cost of the works, this was only rendered possible by the peculiar law of rating. Dealing with the value of the reservoirs and filter-beds, Counsel proceeded to argue in favour of Mr. Valon's figures as against those of Mr. Hunter or Mr. Marshall. In conclusion, he said he looked upon the appeal as an attempt by the Company to get out of a rating which was essentially fair, by methods which were certainly not altogether justifiable.

Friday, Nov. 22.

Mr. BALFOUR BROWNE to-day replied on the whole case for the Company. At the outset, he said he would like to point out that the parishes had undertaken their cases totally unprepared to value for themselves, and anxious to fish out of the Company any information they could. The Company had gone to the Sessions to say that the old assessment was wrong; and they were taking the responsibility of making the assertion. It was not necessarily a new assessment that was being appealed against. With regard to what should be the tenant's share of the net receipts, Counsel thought a great amount of law and a great amount of ingenuity had been wasted. His friends on the other side had said: "You must take the tenant for the purpose of rating as the tenant coming in under the statute. Under those circumstances, he would not have to pay his rent in advance, but at the end of the year." He submitted that the Act was not for that purpose. It did not determine the tenancy; it only determined the amount of rent that was to be put in for valuation purposes. If it was necessary for the Arbitration to consider it, Counsel would ask him to assume that an agreement had been arrived at between landlord and tenant with regard to the payment of rent. The Company's dividends were paid half yearly; and these dividends represented the rent which the tenant had to pay for the obligation. The Company said that the tenant taking over the undertaking with a rent of something like £130,000 a year, would not be satisfied with less than £15,000 per annum. Supposing the respondents could make out to the satisfaction of the Arbitrator that all the money came in before a single penny had to be expended, would he give the hypothetical tenant nothing for managing the undertaking? That was the respondents' case. He (Mr. Balfour Browne) maintained that the sum of £15,000 which the Company arrived at was not too much to allow the tenant for managing so great a concern. The tenant must have an inducement to work the undertaking; otherwise he would not take it over. Proceeding, Counsel dealt with the questions raised by the Arbitrator. In reference to the first—What was the effect (if any) on the rateable value of substituting wood for macadam over pipes already laid?—he ventured to say that, just as in taking the structural value of a house the cost of building to-day had to be considered, so they had to look at the structural value of the mains from the point of view of what it would cost to lay them to-day; and therefore macadam, asphalte, or wood had to be looked at. The second question was: With regard to the time for the payment of rent, should the Arbitrator consider that the landlord and tenant had left this to the general law, or that they had made some reasonable agreement on the point prior to the creation of the tenancy? As to this, Counsel would ask the Arbitrator to take into consideration the fact that the dividends were paid half yearly, and therefore to assume that the landlord and tenant had entered into an understanding that it was in this way the rent should be paid, and that it was none the less an annual rent because it was paid by two instalments. Taking the third question—In considering the renewal fund, was the Arbitrator at liberty to take into account renewals rendered necessary by increased public demand?—Counsel contended that the Arbitrator was at liberty to consider the increased demand, but that he was not entitled to consider an increased number of consumers. Supposing that the number of consumers was limited to 65,000, but that their wants grew, it was absolutely necessary for the Company to increase the size of their pipes, although the number of consumers was no greater. If they had to take out a 6-inch pipe and replace it with a 12-inch, then, in his opinion, only the difference between the 6-inch and the 12-inch pipe was an improvement. By the increased demand for water, a very large portion of the Company's plant would be rendered obsolete, though not worn out. The fourth question with which he had to deal was: How should the damage by frost in 1895, and the consequent lowering of mains, be dealt with? With regard to this, Counsel said no doubt to some extent the lowering of the mains was an improvement; but at the same time it might be a matter that the tenant himself would undertake for his own protection in the current year. If that was so, it was not merely an expenditure on the hereditament to command the rent, but an expenditure by the tenant to enable him to earn his profits. He did not think the landlord would be bound to lower the pipes during the year of tenancy.

The ARBITRATOR: But the tenant would not be bound to lower the pipes.

Mr. BALFOUR BROWNE (continuing) said his argument was that, although the tenant was not bound to do it, if a frost occurred in November and froze the pipes, and another was expected in February, for his own protection he would lower them to prevent them again freezing. The tenant, having taken over the undertaking, could not force the landlord to lower the pipes. If the tenant said before taking them over that the pipes were not low enough, and he would not complete the tenancy until they were lowered, it would be a different matter. Then with regard to the fifth question—How should the receipts and expenditure in relation to the supply to the East London Water Company be dealt with? Counsel considered that, as it was not a recurrent receipt, the Company were right in treating it in the way they had—by the suspense account. Lastly, there was the question: What portion of the total expenditure on maintenance and repairs should be borne by the landlord, and what portion by the tenant? Counsel said he could not quite see how that bore. It might refer to the question of tools.

The ARBITRATOR: That is so, and wages.

Mr. BALFOUR BROWNE: No. It bears only on tenant's capital. It has nothing to do with anything else, because before you get at the rateable value, the whole expenses must come off.

The ARBITRATOR: Yes; that was what I had in my mind.

Mr. BALFOUR BROWNE: If I am right—that the tenant has to find his rent—it is the gross rent he has to find, not the net rent; and in the gross rent all this expense must be considered.

The proceedings then terminated.

Mr. Page has arranged to visit the works for inspection, in company with the Engineer and a Surveyor representing both parties, and he will then present his report to the County of London Sessions in due course.

RATING OF THE EAST LONDON WATER COMPANY.

The Valuation Appeal.

Friday, Nov. 8.

At the Westminster Palace Hotel to-day, Mr. HORACE AVORY, K.C., resumed the inquiry into the rateable value of the hereditament of the East London Water Company (*ante*, p. 1185). The matter was remitted to Mr. Avory by the Court; the Company having appealed against their rating by the Assessment Committees of the following East London parishes: Hackney, St. George's; All Saints', Poplar; Bromley, St. Leonard, and Stratford-le-Bow; St. Anne's, Limehouse, and the Hamlet of Ratcliff; Bethnal Green; St. Leonard's, Shoreditch; and Woolwich.

Mr. BALFOUR BROWNE, K.C., Mr. C. A. CRIPPS, K.C., and Mr. DOUGLAS BARTLEY appeared for the Company; while all the parishes, except Woolwich, were represented by Mr. F. MARSHALL, K.C., and Mr. ENGLISH HARRISON, K.C.

Mr. *H. E. Jones* was called on behalf of the Company, and presented his valuation, which practically coincided with that of Mr. William Marshall, except in regard to tenant's capital. The total percentage upon which he worked out the valuation for each parish was 6·43 of the gross receipts. He estimated the net rateable value of the property, *plus* rates, at £178,913, from which he deducted the following items: Rateable value, *plus* rates, of land and works, £109,747; rateable value of pumping and carrying mains, *plus* rates, £44,065; and rateable value of offices, £963. This made the total rateable value of the indirectly productive portion of the undertaking £154,775, which, being deducted from the total of £178,913, left the rateable value of the directly productive portion, *plus* rates, at £24,138—equal to 6·43 per cent. of £364,403, the total receipts for the year.

Witness was cross-examined by Mr. F. MARSHALL, on the lines which governed the cross-examination of Mr. W. Marshall.

Mr. *W. B. Bryan*, Engineer to the Company, was then called, and gave the length and value of the 6-inch service-mains and all larger ones in the various parishes, as well as the length and value of the carrying and pumping mains. Mr. Balfour Browne elicited that those were the items upon which the Company's valuers had based their figures. The list as given by Mr. Bryan is as follows:—

Hackney.

	Length.	Value.
Service-mains and pipes . .	140,440 yards	£36,709
Carrying and pumping mains .	52,513 ,,	79,737
Totals	109 miles 1113 yards	£116,446

Limehouse.

Service-mains and pipes. . .	23,691 yards	£6,120
Carrying and pumping mains .	8,973 ,,	5,575
Totals	18 miles 984 yards	£11,695

Mile End Old Town.

Service-mains and pipes . .	69,441 yards	£17,699
Carrying and pumping mains .	34,823 ,,	27,337
Totals	59 miles 434 yards	£45,036

All Saints', Poplar.

Service-mains and pipes. . .	47,599 yards	£12,086
Carrying and pumping mains .	20,511 ,,	11,254
Totals	38 miles 1230 yards	£23,340

Hamlet of Ratcliff.

Service-mains and pipes. . .	12,766 yards	£3,191
Carrying and pumping mains .	5,567 ,,	3,196
Totals	10 miles 1133 yards	£6,387

Shoreditch.

Service-mains and pipes. . .	18,430 yards	£4,918
Carrying and pumping mains .	15,087 ,,	21,237
Totals	19 miles 77 yards	£26,155

North Woolwich.

Service-mains and pipes. . .	2,669 yards	£706
Carrying and pumping mains .	1,240 ,,	666
Totals	2 miles 389 yards	£1,372

Bethnal Green.

Service-mains and pipes. . .	76,839 yards	£19,373
Carrying and pumping mains .	32,565 ,,	31,077
Totals	62 miles 684 yards	£50,450

Bow.

Service-mains and pipes. . .	29,864 yards	£7,612
Carrying and pumping mains .	17,812 ,,	30,405
Totals	27 miles 156 yards	£38,017

Bromley.

Service-mains and pipes. . .	43,614 yards	£11,299
Carrying and pumping mains .	19,560 ,,	15,883
Totals	35 miles 1574 yards	£27,182

St. George's in the East.

Service-mains and pipes. . .	27,627 yards	£6,976
Carrying and pumping mains .	12,588 ,,	7,377
Totals	22 miles 1495 yards	£14,353

Mr. BALFOUR BROWNE: Then, I believe, you have in detail the valuation of the works in the various parishes?

Witness: Yes; they are as follows:—

	Land.	Works.
East Ham	£845 ..	£36,218
Chigwell (Buckhurst Hill works) .	116 ..	6,968
Chingford	562 ..	38,765
Hackney (Lee Bridge works) . .	4,575 ..	109,716
Hornsey (Finsbury Park works) .	2,000 ..	30,000
Leyton (Lee Bridge works) . .	24,859 ..	450,112
Sunbury	8,483 ..	151,934
Sunbury (Riverside works) . . .	2,463 ..	23,715
Walthamstow (Woodford Hagger Lane)	1,906 ..	57,744
Walthamstow reservoirs . . .	86,200 ..	506,030
Walthamstow (Ferry Lane). . . }	1,517 ..	31,515
Walthamstow (Ferry Lane well) . }		23,830
Walthamstow (Copper Mill Lane)	125 ..	61,173
Waltham Abbey works	215 ..	33,507
Waltham Abbey (High Beech works)	375 ..	12,541
Waltham (Intake from River Thames)	195 ..	1,788
Totals	£134,436 ..	£1,575,556

Mr. BALFOUR BROWNE: Now, turning to another point, what is the reservoir capacity?

Witness: 1270 million gallons, of which 70 millions is called bottom water—leaving 1200 millions net.

Is that existing?—Yes.

And what have you in course of construction?—Two reservoirs to hold 1200 million gallons more.

And you have also additional powers?—Yes; we obtained powers last year to construct other reservoirs to hold 5500 million gallons.

When you have these reservoirs, you will not need to have further recourse to outside Companies?—No.

Witness (continuing) said that the total net revenue fluctuated very considerably. In 1894, it was £171,361; 1895, £143,576; 1896, £159,074; and 1897, £186,075.

Mr. BALFOUR BROWNE: That, I think, is top water mark?

Witness: Yes. In 1898, the amount was £159,944; 1899, £157,589; and 1900, £167,337.

As to maintenance and repairs of mains, the witness said he had taken these items from 1894 to the present time. The average of the six years was £23,366. Mr. W. Marshall had not taken this average figure, but £19,065.

The inquiry was then adjourned.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1376.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME	Closing Prices.	Rise or Fall in Wk	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	Nov. 13	6¾	Bombay, Ltd. . . .	6¼—6¾	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅝*	..	5 9 5
380,000	Stk.	Aug. 15	12	Brentford Consolidated	265—270	..	4 8 11
270,000	,,	,,	9	Do. New . . .	192—197	..	4 11 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	130—135	..	3 14 1
206,250	,,	June 14	4	Do. 4 p.c. Deb. .	114—117	..	3 8 5
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	222—227	..	4 8 1
246,320	,,	,,	7	Do. A. Ord. Stk. .	155—160	..	4 7 6
1,047,500	Stk.	Aug. 28	5	Bristol, 5 p.c. max. .	119—120	..	4 3 4
420,000	20	Sept. 27	10	British.	41—42	..	4 15 3
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
82,850	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	9—9½	..	6 6 4
220,000	Stk.	June 28	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
150,000	20	July 17	8¼	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept 27	10	Cape Town & Dis., Ltd.	14½—15½	..	6 9 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	273—278	+3	4 6 4
236,425	,,	,,	9	Do. New do. .	203—208	..	4 6 7
238,237	,,	June 14	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	May 31	9	Continental Union, Ltd.	167—172	+2	5 4 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	162—167	..	4 3 10
575,000	Stk.	Aug. 29	5	Crystal Palace Ord. 5 p.c.	122—127	..	3 18 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 18 2
486,090	10	July 17	10½	European, Ltd. . . .	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,079,885	Stk.	Aug. 15	4 1/16	Gas- 4 p.c. Ord. . . .	98—100	+1	4 8 0
2,600,000	,,	,,	3½	light 3½ p.c. max. .	88—90	..	3 17 9
2,799,735	,,	,,	4	and 4 p.c. Con. Pref.	112—115	..	3 9 7
4,063,425	,,	June 14	3	Coke 3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14*	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	213—218*	+2	4 11 9
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Aug. 29	10	Liverpool United A	231—233	..	4 5 10
718,100	,,	,,	7	Do. do. B	170—172	..	4 1 5
306,083	,,	June 28	4	Do. do. Deb. Stk.	119—120	..	3 6 8
75,000	5	June 14	4	Malta & Medn., Ltd. .	4½—5	..	4 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	105—108	..	4 12 7
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9½—10⅝*	..	6 13 4
717,946	Stk.	Aug. 9	8½	Newc'tle & G'tesh'd Con.	214—216	..	3 18 8
312,855	Stk.	June 28	3½	Do. 3½ p.c. Deb.	97—99	..	3 10 8
150,000	5	May 15	8	Oriental, Ltd. . . .	7⅞—8¼	..	4 17 5
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7¼	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
60,000	5	Sept. 27	7	Ottoman, Ltd. . . .	5⅞—7/8	..	5 12 0
851,070	10	Oct. 11	7	River Plate Ord. . .	10¼—10¾	−⅛	6 10 3
250,000	Stk.	June 28	4	Do. 4 p.c. Deb..	95—97	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd.. . .	11—12	..	6 13 4
135,000	Stk.	Sept. 12	10	Sheffield A	242—244	..	4 2 0
209,984	,,	,,	10	Do. B	242—244	..	4 2 0
523,498	,,	,,	10	Do. C	242—244	..	4 2 0
5,761,885	Stk.	Aug. 15	5	South Met., 4 p.c. Ord.	123—125	..	4 0 0
1,627,965	,,	July 17	3	Do. 3 p.c. Deb. . .	91—94	..	3 3 10
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	102—106*	..	4 14 4
70,825	,,	July 17	4	Do. 4 p.c. Deb.	104—109	..	3 13 5
120,000	Stk.	Aug. 29	5½	Tottenham and Edmonton A. 5 p.c.	122—127	..	4 6 8
250,520	,,	,,	4	Tottenham and Edmonton B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd. . . .	8—9	..	5 11 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95—100	..	5 0 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9⅜—10¼	..	4 5 9
172,000	10	,,	6	Do. 7 p.c. . .	12⅜—13⅜	..	4 8 11
140,900	Stk.	June 28	4	Do. 4 p.c. Deb.	107—112	..	3 11 5
				WATER COMPANIES.			
780,599	Stk.	June 28	11	Chelsea, Ord. . . .	312—317	..	3 9 5
150,000	,,	,,	5	Do. 5 p.c. Pref. .	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Oct. 11	7	East London, Ord.. .	200—205	+2	3 8 4
654,740	,,	June 14	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
700,000	50	June 14	8	Grand Junction 10 p.c. max..	117—120	+2	3 6 8
310,000	Stk.	Sept. 27	4	Junction 4 p.c. Deb..	122—126	..	3 3 6
708,000	Stk.	Aug. 15	14	Kent	299—304	+2	4 12 1
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—205	..	3 8 4
1,043,800	100	June 28	10½	Lambeth, 10 p.c. max..	297—302	..	3 9 6
406,200	100	,,	8	Do. 7½ p.c. max..	217—222	..	3 12 1
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
500,000	100	Aug. 15	12 8/10	New River, New Shares	395—405	..	3 3 2
1,000,000	Stk.	July 31	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	June 14	6	South-wark and Ord. . . .	198—203	+3	2 19 1
126,500	100	,,	6	South-wark and 7⅞ p.c. max.	185—190	..	3 3 2
489,200	Stk.	,,	5	South-wark and 5 p.c. Pref. .	150—155	+3	3 4 6
1,019,585	,,	Oct. 11	4	Vauxhall 4 p.c. A Deb.	124—129	..	3 2 0
1,155,066	Stk.	June 14	10	West Middlesex. . .	290—295	..	3 7 10
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	138—143	..	3 2 11
200,000	,,	Sept 12	3	Do. 3 p.c. Deb. .	94—97	..	3 1 10
				* Ex div.			

Monday, Nov. 18.

The ARBITRATOR, at the outset, asked if any agreement had been arrived at with reference to the loose tools.

It was stated that no arrangement had been made; and it was decided to leave the question over to see if Mr. W. Marshall and Mr. Lyon Ryde could settle the matter.

Mr. *Bryan* was further cross-examined by Mr. MARSHALL. Witness said that the stock of meters had been valued by Mr. Marshall, and the cost had been taken out at the actual cost to the Company from their books. These meters were never discarded, but were regularly renewed. Take a Siemens meter. The case was of cast iron, and the inside works of brass. These inside works were renewed from time to time out of revenue; and if from frost the cast iron burst, it was also renewed out of revenue. So that a meter 25 or 30 years old came back from the repairer's just as good as a new one. They had more of Guest and Chrimes's meters than of any others. The Siemens meter—which was Guest and Chrimes's make—they used for all large supplies where the water was drawn direct; but for any small supplies, if the water was drawn into a big cistern, they preferred to put in a positive meter, because for very small flows the inferential meter did not register all the water passing through. During the last six or seven years, instead of adding new Siemens meters, the Company had bought positive meters. All these meters were on the consumer's premises, and were fixed as nearly as possible at the point of entry of the water to the building.

The ARBITRATOR: Will you tell me how this is material? I am not following it.

Mr. MARSHALL: In regard to meters, the only decision—certainly the only one which is generally followed—is in reference to gas-meters under the Lee case. There has been no decision, as far as I am aware, with reference to water-meters; and it is still a moot point as to whether they are chattels or whether they ought to be taken as part of the rateable hereditament.

Mr. BALFOUR BROWNE: They belong to us, and not to the rateable hereditament. They are meters upon some other people's premises.

Witness was examined in great detail as to the cost of labour in the various works of the Company. He had carefully considered the figures, and came to the conclusion that two-thirds to the tenant and one-third to the landlord would be a fair allocation. He then described two meters (which he produced) both about 25 years old, one of which had been renewed and repaired. The private consumers paid a rent for the meters, which amount was included in the gross receipts. The service-pipe from the main belonged to the consumer; but the meter was rented to him by the Company, and remained their property. To his knowledge, there was no single meter the property of a consumer.

Counsel then asked questions as to the cost of the various meters and their different qualities.

The ARBITRATOR said he did not see that the particular merits of the different meters had to do with the question. He was not going to decide on this point.

With regard to the allocation of the repairs and renewals of mains, witness said they had generally charged renewals to the landlord and repairs to the tenant. As to the pumping and engine charges, each engine had been taken separately. In the matter of filtration, the total labour for cleaning the filter-beds and washing the sand was charged to the tenant, and the concreting and repairs to the banks to the landlord. As to the Hanworth reservoir, he knew that Mr. Marshall valued it in 1886 at £6250. His valuation was based on the price of labour two or three years ago; and he could not to-day replace the reservoir for less than £10,000. Why it was valued in 1886 at £6250, he could not say. In his opinion, it was a very low valuation; and he thought there must be some item missed out of it. The reservoir was built many years ago, so they had made a valuation of it; but of the later buildings, where they could ascertain the cost from the books, they had taken the actual outlay. Even supposing the old reservoir only cost £6250, in his judgment the value to the tenant would be the sum he had given —£10,000.

Mr. MARSHALL: For the purpose of ascertaining the rental value—that is the only object we have in pursuing this inquiry—do you assume that the whole of this property of every kind, including the service-pipes, has gone up in rental value in consequence of the rise in labour and material?

Witness: I have not considered that at all myself. I am here simply to confirm or otherwise the structural value. I have gone into none of the theories you are putting to me now.

Continuing, witness said the rise in labour had not been very great; but the decrease in the amount of work done per day was considerable. In the case of ordinary labourers' work, he should say there had been a rise in the value of the work done of 20 per cent. Speaking generally, there had not been a great rise in the cost of mains; but the actual cost of laying mains, including the pavement, had enormously increased. He had for many reasons not considered the question from the rating point of view. One of these reasons was that he had not had the necessary time. Witness was next questioned at some length as to the price of the various reservoirs. That at Walthamstow cost £412 per million gallons; and he had valued it at £400. Eight of the reservoirs he had valued fifteen years ago; and he had fixed them at £350 per million. But they had made two reservoirs since then—the East and West Warwick—which had cost over £400 per million. As to the price of the filter-beds, these were valued by Mr. Marshall at 28s. 6d., excluding sand. To-day they were taken at 45s., including gravel and sand and the filtered-water reservoir in the centre of each group. That was the cost of constructing filter-beds at the present time. Those completed at Ferry Lane cost only 29s. 8d. They were very cheap; and the explanation was that they found on the site everything they wanted for their construction The 5 acres of filter-beds made at Hampton for the Joint Companies cost £12,000 an acre. Witness was further cross-examined as to the horse power of the engines, the depth of the wells, and the length of the adits, details of which have already been given in evidence. With regard to the valuation of the eight Cornish boilers, which had been raised from £2400 in 1886 to £3000, this arose from the increased price of boilers. He had taken nothing

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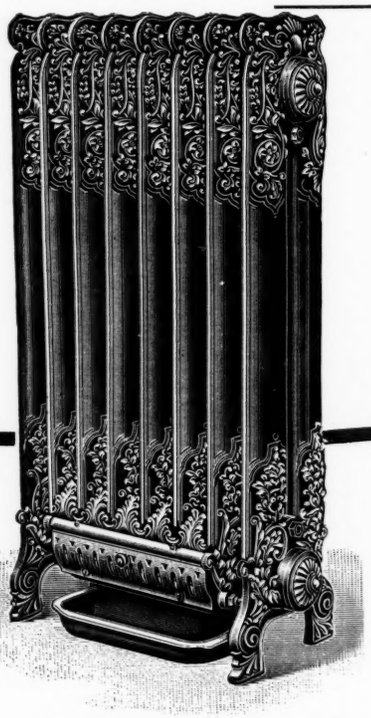

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off for depreciation, because they kept the whole of their plant up to the very highest point of efficiency, and year by year all the cost of renewals and repairs was charged to revenue account. There was a large margin of pumping power beyond the actual average quantity pumped day by day. The total pumping power in regard to the Lea supply was 102,750,000 gallons daily, and the average quantity pumped was 29,760,000 gallons. As to the Thames supply, the pumping power was 21,000,000 gallons; and during the last eighteen months they had been pumping rather more than 10,000,000 gallons a day—the full extent of the carrying main.

In reply to Mr. HARRISON, witness said the gross receipts of the Company had steadily increased from £289,731 in 1894 to £354,950 in 1899. As to the cost of the paving, Counsel submitted that the charges at Poplar were much lower than 4s. a yard. Witness said that, even if this were so, the figure of 4s. was just an average amount over the whole of the parishes.

Replying to Mr. SINCLAIR COX, witness stated that the chief sources in the fluctuation of the net revenue would be the repair and maintenance of the mains, the extra payment for water in particular years of drought, and the increased price of coal. Counsel put it to the witness that, averaging these fluctuations, the undertaking of the Company had been continuously progressive. Witness said he had not taken out these figures. He knew Mr. Marshall, when he put his valuation before the Assessment Committee, took a figure of 4·61 as the percentage, and that now the percentage he took was 6·56; but he could not say where the principal difference would be. He had not these figures before him.

Tuesday, Nov. 19.

Mr. *Bryan*, re-examined by Mr. BALFOUR BROWNE, said that as to the modern buildings and wells, they had taken the actual cost; and where they could not get the cost, they estimated at present prices. Among the items included under the head of repairs and renewals, was the work necessary to keep the reservoirs in order—such as raking the paths, digging up the weeds, and cutting the grass. The East and West Warwick reservoirs cost £159,419. They were large; one being of 210 million gallons, and the other of 177 million gallons capacity. The others, which were valued in 1886 at £380 per million gallons, were comparatively small. In his judgment, the only proper way of getting at the structural value was to take the prices at the time when they were valuing. The filter-beds had been valued at £11,000 per acre; but those constructed at Hampton had cost £12,000 per acre.

Mr. *Walter Hunter*, Engineering Director of the Grand Junction Water-Works Company, said he had inspected the various stations, and had carefully considered the accounts with Mr. Marshall and Mr. Bryan. He had gone into the value of the works and the service and pumping mains. He confirmed the valuation of Mr. Marshall as an engineer, and not as a rating surveyor. As to the way in which Mr. Marshall had allocated the figures between landlord and tenant, he found this was in about the same proportion as in his own Company. With reference to the cost of filters, the amount allocated by his Company to the landlord was 23·4 per cent.—confirming Mr. Marshall's allocation of 25 per cent. as fair and reasonable. With reference to the Hanworth reservoirs, he had seen the plans and checked the prices, which he thought reasonable, and less than he had been paying for similar work at Staines.

In cross-examination by Mr. MARSHALL, witness said, with regard to his valuation generally of reservoirs, filters, and other works, it bore no relation to the rent a hypothetical tenant would expect to pay.

Mr. *I. A. Crookenden*, Secretary of the Company, produced the half-yearly accounts ending Christmas, 1899, and Midsummer, 1900. Replying to Mr. ENGLISH HARRISON, witness said he found the summary of water rates and rentals given did not include the amount paid by builders for water supplied to premises in course of erection. This amounted, for the year, to £6208. Schedule A, however, gave the total receipts of the Company. The rental summary was only used on the tenant's capital point. The additional amount for repairs and maintenance in 1898 (£25,000, as compared with £17,000 in 1897) arose from a sum of £9019 having been expended on distributing water during the drought in the summer of 1898.

The ARBITRATOR said Mr. Bryan had put in a table showing that the maintenance and repairs averaged for six years £23,366 per annum. That amount of £9000 would have to be taken out, which would reduce the average by £1500 a year.

Mr. CRIPPS said, subject to the adjustment of this item and the apportionment of the building rates, that was his case.

Mr. MARSHALL remarked that there was so much left over that it was almost impossible to complete their case.

Mr. HARRISON said he thought if time were given to enable these various matters to be adjusted, a great deal of trouble would be saved.

After some discussion,

The ARBITRATOR said his view was that there was a disposition to treat him as if he were sitting to prepare the case for appeal. He was there to try it; and the parties ought to have been prepared to try it in the spring, and presumably were ready to try it. The details were none of them of importance; and there was so much in controversy with principle and in the main figures, that the respondents should go on to establish their valuation. He would, of course, give every facility for clearing up any matters left over.

(To be continued.)

MANCHESTER CORPORATION WATER SUPPLY.

Full Supply Restored—Second Pipe from Thirlmere.

The Water Committee of the Manchester Corporation met last Thursday, under the presidency of Sir John Harwood, and decided to remove all restrictions, as from the following Saturday, upon the water supply under their control. The effect of recent heavy rains has been to so far fill the reservoirs at Longdendale as to make the question of

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a water famine rather remote. On Wednesday the quantity of rain falling in that watershed was equal to 1·22 inches; resulting in an increase of 504 million gallons of water in the reservoirs, which at the end of the week contained 2444 millions. This quantity of water, calculated upon the present average rate of consumption of 25 million gallons a day, is equal to 97 days' supply; but in view of the resumption of the constant service, it is anticipated that the average daily consumption will touch 32 millions in future. The stock in hand was at its lowest point during the late drought on the 9th of November, when it stood at 552 million gallons, which was estimated to be sufficient for 18 days' supply. Since then it has continued to increase, and from Sunday week the inflow has been tremendous. It is four months since the curtailment of supply began (July 21), and it gradually grew in rigidity. Having dealt with the question of the immediate supply of water, the Committee next turned their attention to the subject of the laying of the second pipe from Thirlmere; and it was decided that tenders for putting down the first section—namely, that between Prestwich and Hoghton, near Blackburn—should be advertised for this week. There will be 14 miles of cast-iron pipes 44 inches in diameter, and 10 miles of similar pipes 40 inches in diameter, with three-quarters of a mile of steel pipes to be used in carrying the line over bridges. An effort was made to persuade the Committee to use steel pipes throughout the distance; but Mr. G. H. Hill, the Water-Works Engineer, declined to accept the suggestion. The steel tubes are to be used experimentally, and therefore will be placed in positions where they can be easily watched and tested. The pipe laying is not continuous. There are intervals along the route where the aqueduct is already made in "cut and cover" of sufficient capacity to pass 50 million gallons daily; and with these sections the new pipe has to be coupled up.

BRADFORD AND THE GOUTHWAITE RESERVOIR.

Board of Management Appointed.

As was reported in last week's issue (p. 1327), the Gouthwaite compensation reservoir on the River Nidd has been certified by the Knaresborough Magistrates to be completed; and the control therefore passed from the Bradford Corporation to the new Board of Management. This Board consists of millowners on the River Nidd, and certain representatives appointed by public bodies. In the case of millowners, the number of votes is according to the head of fall of water in feet; and the voting is in respect of the property, and not of the individual, so that two gentlemen representing the same property would have no more voting power than one. An occupier can use the votes if necessary, instead of an owner. Mr. George Metcalfe has been appointed Chairman of the Board; and Mr. J. R. Wood, who has for many years been Solicitor to the York Water-Works Company, has been elected Clerk.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At a meeting of the Corporation of Glasgow on Thursday Mr. Cleland asked the Convener of the Gas Committee, with reference to the resolution of the Council to pay time-and-quarter for Sunday labour at the gas-works, whether it had been arranged that such labour should be from 6 a.m. to 6 p.m.; and he further wished to know by whose authority these hours had been fixed. Mr. Fife, the Sub-Convener, in reply, said he had had no notice of the question; but the matter was one which was under the control of the Engineer, and he would call his attention to it. I suppose that what is meant by this is that it has been arranged that stokers will have to work twelve hours on Sundays before overtime begins. If that be so, it is not likely that the men will accept it, because, even although their duties on Sundays should be so light that they did not work so much in twelve hours as they did on week-days in eight hours, it will be impossible to get them to forget that they are so many hours on duty, and therefore prevented from enjoying themselves according to the bent of their own mind. On the other hand, to pay time-and-quarter after the eight hours, would mean either a greater number of men on duty, so as to prevent anyone working overtime, or the payment of four hours' overtime to each man, which would add very largely to the wages bill, and which is doubtless what the men would most approve of.

At the same meeting, Bailie D. M. Stevenson moved that in future a summary of the accepted tenders for coal be minuted, with the names of the offerers, the pits, the quantities, and the prices. The principle, he said, was carried out in other Committees of the Corporation. The prices paid for coal were usually quoted on the Stock Exchange within an hour or two after the contracts were made; and they also got into the newspapers. It would be to the advantage of the Corporation that the correct figures should be given to the public. Bailie Willock said he could not see any advantage there would be to the public in knowing the prices paid by the Corporation for coal; but he could perceive that a considerable benefit would be derived by coal exporters, if they learned the prices. It was well known that coalmasters sold large quantities of coal to the Corporation; and if coal exporters knew the prices, they would doubtless try to get the same benefits. This would be very much against the interests of the Corporation. Mr. Paton supported Mr. Willock's view, and stated that coalmasters disliked extremely that the world should know the prices at which they supplied coal to the Corporation, because all customers—large and small—would be asking for the same prices. It was known that the Corporation gave huge orders; and if the prices were published, the result would be that the coalmasters would ask 2d., 3d., or 6d. more per ton for their coal than they did now. He therefore hoped the Corporation would keep things as they are at present. Any member of the Corporation could easily ascertain the prices paid, by applying to Mr. Foulis. Mr. Bilsland said it was

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true that the prices could not be kept secret; but they had not the same weight as they would have if they were sent out officially. Mr. Fife said that Mr. Mitchell, the Convener of the Committee, had offered to retire from the Contracts Committee, provided that the other two members who were connected with the coal trade did the same; but Mr. Mitchell had done his work so well that the Committee wished to retain his services. The present arrangement had worked satisfactorily for many years; and he hoped the Council would support the Committee This the Council did, on a division, by a large majority; and thus the Corporation have shown their usual good sense.

A meeting of the Arbroath Gas Corporation was held on Tuesday, to consider as to the filling up of the vacancies at the gas-works. The mason at the works was appointed *interim* foreman. A minute of a Special Committee recommended that a Manager be advertised for at a salary of £200 per annum, with free house, coals, gas, and taxes (except income tax), the person appointed to enter upon his duties on the 1st of January next, or as soon thereafter as can be arranged. Provost Grant moved approval of the recommendation, and Bailie Alexander seconded. Ex-Bailie Sandeman moved that the salary be £200 per annum, with a free house, but without coal, gas, or taxes. Mr. Alex. Smith seconded, remarking that the time of perquisites of this kind had come to an end. Mr. A. M. Dundas said he would be inclined to pay the taxes, because they were putting the Manager into a house considerably larger than a salary of £200 would admit. A vote was taken, when thirteen voted for the motion, and three for the amendment; and one declined to vote. Mr. Carlow's severance from the service of the Corporation is thus finally resolved upon. In fact, the Corporation are already advertising for a successor. During the whole proceedings, Mr. Carlow has never opened his mouth, nor lifted his hand to avert the blow.

The fashionable watering-place of Moffat has ben agitated over a question as to a structural alteration at the gas-works, which is of itself of little consequence, but which has a general application. The Gas Company extended a coalshed at their works; and this proceeding was called in question by the Burgh Prosecutor, who maintained that the Company should first have laid their plans before the Town Council for approval. The question was brought before the Police Court on Tuesday, when the Secretary of the Company was charged with having contravened section 169 of the Burgh Police (Scotland) Act, 1892, by having taken down the gable of a coalshed and erected a stone and lime addition to it, extending to 7½ feet in length and 12 feet in height. The case went to trial; and after a long hearing, the Bench found that the charge had been clearly proved. The case, however, having been the first of its kind in Moffat, and there having been some doubt about the necessity of submitting plans to the Town Council, they merely admonished the Secretary of the Company. Now, as to this matter, although it was, in the main, probably only a question between two local practitioners, it is right to mention, for the benefit of others who may be similarly situated, that the law is very wide in its sweep in this matter. To my knowledge, a railway company, with statutory powers, attempted to get outside the burghal enactment in the reconstruction of a bridge, but were held to be in the wrong, and subjected in a penalty for not having first obtained the sanction of the corporation. This was a case which went much further than the one at Moffat; and if it had been known, there need have been no reference to the Police Court at Moffat, as the principle had been laid down by a very much higher authority that in all cases of structural alteration the corporation must be consulted.

At a meeting of the Gas Committee of the Dundee Town Council on Tuesday, a petition signed by 106 ratepayers and others was presented, in which the attention of the Committee was directed to the nuisance caused by smoke escaping from the gas-works; and the Committee were requested to devise ways and means for the abatement of the trouble, which, it was said, is causing great annoyance and discomfort. It was stated that the Engineer (Mr. W. M'Crae) has under consideration schemes for dealing with the egress of smoke from the retort-house; and he was directed to submit a report on the subject to an early meeting of the Town Council. I suspect the outcry is really a case of much ado about nothing.

There have been defalcations on the part of public officials of late years, not many in number, but of sufficient magnitude to make it essential that the auditing of accounts should be more strictly looked after. To secure this, recourse has been had to auditors who are altogether independent of the bodies whose work they are appointed to supervise. This means an independent appointment, a duty which has fallen, latterly, upon the Secretary for Scotland. So far, the system has worked well; but there is a rising feeling among municipalities that the accountants who are being appointed are, in practice, magnifying their position—that, in point of fact, they are asking too much for their labours. One of the places affected is Dumfries, where the Auditor is charging £63, with £8 7s. 6d. for travelling and hotel expenses, for the audit of the burgh accounts. Of this sum, £31 10s. is applicable to the accounts of the Gas Departmemt. It does seem a large sum; but an outsider can scarcely criticize such a matter on its merits, because he is not acquainted with the circumstances of the case. Mr. Hiddleston remarked that there had been a great amount of special work in this, the first year; and he thought it would be well to inquire what was to be the charge in future. The matter was remitted to the Finance Committee. In one other burgh, the corporation have refused to pay the charge, and the Secretary for Scotland has caused a letter of a scolding nature to be sent to them; but the subject has also been commented upon at meetings of other corporations. It would seem as if the next step should be the fixing of a statutory fee for audit work, which would enable corporations to know just what their obligations would be.

It will be remembered that some months ago the Town Council of Perth made a change in their method of hiring out gas-stoves. The business had previously been in the hands of Mr. John Macpherson, as agent for the manufacturers. The Council took it into their own hands—a step which has given dissatisfaction to Mr. Macpherson, whose income it has seriously affected. The new policy seems to have been

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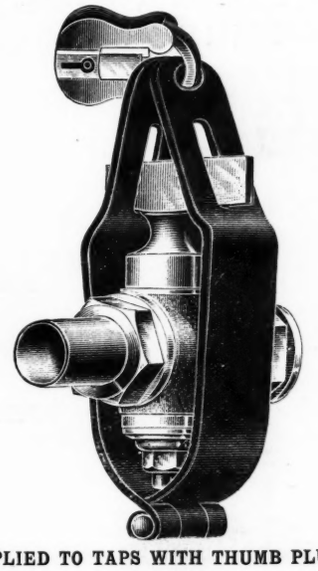

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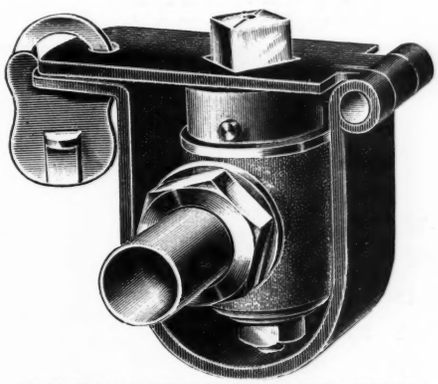

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favourably mentioned during the recent municipal contest by Bailie Watson, the Convener of the Gas Committee; and, following upon that, it is announced that Mr. Macpherson has challenged Bailie Watson upon his statements, that the challenge has been accepted, and that both parties have deposited a cheque for £20 with the City Chamberlain, to await the result of an inquiry by a neutral person. Whoever is found to be in the wrong is to forfeit his deposit, which is to be paid into the funds of the Royal Infirmary at Perth.

The Bridge of Earn Gas Company have completed their arrangements for taking a supply of gas from the Perth Corporation, and have resolved to borrow £2000 with which to lay the main from the Perth Gas-Works. The work, it is stated, will soon be completed.

This week has proved a good one for the Edinburgh Water Trust. There have been copious rains, with the result that the reservoirs are slowly filling up. A fortnight ago, there was only two-fifths of the quantity of water in store which there was at the same date last year. Now there is fully more than half, and the rain is still frequent. The total for the year is, however, much below what it was last year; being from 11 to 12 inches less, which is a serious consideration.

In this connection, it may be mentioned that the Leith Town Council, under an influence which it is difficult to classify with anything like exactitude, declined to re-elect ex-Bailie Archibald as one of their representatives upon the Trust. Mr. Archibald has been Convener of the Works Committee of the Trust for many years, and has the whole of the details of the Talla extension scheme in hand in a way that no one else has. It would be a calamity to the Trust were his services lost to them at the present time; but apparently that is not to be—and fortunately so—because it is announced that Treasurer Cranston, of Edinburgh, is to retire from the Trust, in order that the Corporation of Edinburgh may elect Mr. Archibald as one of their representatives. This is public spirit which deserves to be recognized and commended.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 23.

Sulphate of Ammonia.—Although production is approaching its maximum, demand continues to absorb supply. On the east coast, there has been some improvement in values; while on the west coast, although the tone is easier, prices are unchanged—the quotations being £10 17s. 6d. per ton f.o.b. Hull, £11 per ton f.o.b. Leith, and £11 1s. 3d. per ton f.o.b. Liverpool. For December delivery, a premium of 1s. 3d. to 2s. 6d. per ton is asked; but buyers' views are scarcely above prompt prices. For delivery over the spring months, buyers have been endeavouring to get on at £11 2s. 6d. per ton, f.o.b. Leith. But makers are firm at £11 5s. per ton; and this price has not so far been paid.

Nitrate of Soda is steady in all positions, though consumers do not show much interest for delivery ahead. The spot quotations remain 9s. 3d. and 9s. 4½d. per cwt. for ordinary and refined qualities.

LONDON, *Nov.* 23.

Tar Products.—Pitch remains very firm, and the difficulty in obtaining supplies for prompt delivery continues. It is almost impossible to name the actual value in London. In fact, there are no sellers for prompt delivery; but a fairly good business is doing at outports. The demand from South Wales is still very strong, especially for prompt delivery. Ninety per cent. Benzol is also better. Business is reported at 10½d., November-December, and at 11d. January-March, both f.o.b. London. As a rule, makers ask still higher prices for forward delivery, a very good demand being anticipated for gas enrichment. In 50-90 per cent., further business has been done at 9½d. for November-March; and there are still buyers at this price for home consumption. Crude carbolic remains in the same position. Sales of 50's are reported at 1s. 8d., and of 75's at 2s. 5d.; while as regards 60's, an offer of 1s. 11½d. over all next year has been declined, makers holding for 2s. Crystals are rather better, and there appears to be an improved demand, especially for early delivery. Some makers have raised their quotations. Creosote remains firm, and there is a fairly good business doing in the North. Some quantity has been placed at 1½d., and there are still sellers at this price for forward delivery. As regards anthracene, there are still inquiries for "A" quality all over next year; but consumers will not pay more than 2¼d. per unit, and none of the best makers will accept this price. As regards tar, there is absolutely nothing of importance to advise.

The average values obtaining during the week are: Tar, 15s. to 18s. Pitch, east coast, 34s. 6d. to 35s.; west coast, 33s. 6d. to 34s. Benzol, 90's, 10½d.; 50's, 9½d. Toluol, 10d. Crude naphtha, 4½d.; solvent naphtha, 11d.; heavy naphtha, 10d. to 11d. Creosote, North, 1⅛d. to 1¼d.; London, 1¾d. Heavy oils, 2⅛d. to 2⅜d. Carbolic acid, 60's, 1s. 11d. Naphthalene, 60s. to 80s.; salts, 30s. to 45s. Anthracene, "A," 2d. to 2¼d.; "B," unsaleable.

Sulphate of Ammonia.—The market continues firm; but as regards November-December, there is not quite such a good demand. The Gaslight and Coke Company are still firm at £11 5s. for January-June; but this price has not yet been paid. Business in Leith continues brisk; and further sales are reported at £11 prompt shipment. As regards Liverpool, the demand is not quite so strong; and there is not very much inquiry for prompt shipment. Further sales are reported at Hull at £10 17s. 6d. November-December; but an offer of £11 for January has been declined.

COAL TRADE REPORTS.

Lancashire Coal Trade.—The position in the coal trade of this district remains without any material change, except perhaps that there is some improvement in the better qualities of engine fuel, which the leading collieries report to be moving away freely—prices being now readily secured that were not obtainable a month or so back. Inferior sorts of engine fuel, however, remain a general drug on the market, with very keen competition from outside districts at much

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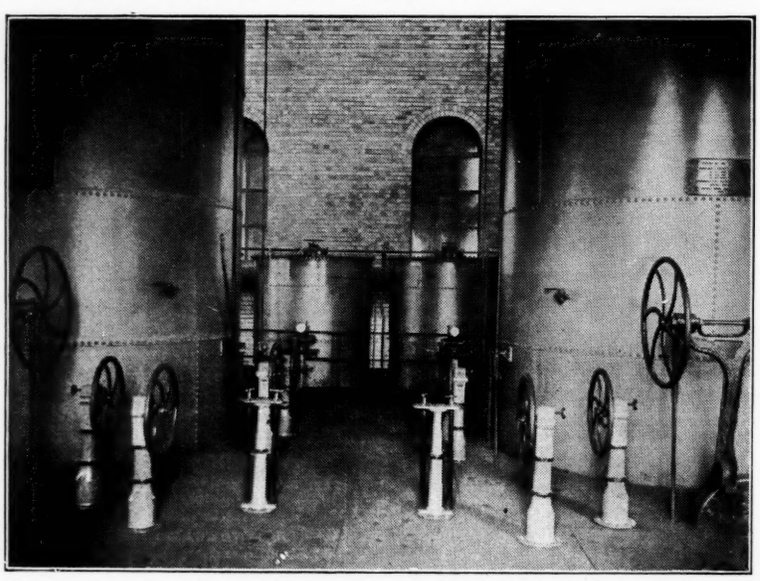

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One-Fifth Section of Birmingham Plant, Windsor Street Station.

The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 12 MILLION CUBIC FEET.

below local prices. In round coals, there is a fairly brisk demand for house-fire consumption, which is taking away all that collieries are raising; and here and there they are beginning to fall back upon stocks to meet requirements. Steam and forge coal, of which the quantity that collieries have to offer is lessened, owing to increased needs for house-fire purposes, is moving away without difficulty, with rather better prices, if anything, obtainable. At the pit quotations average about 15s. per ton for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four-feet and seconds Arley, 11s. to 11s. 6d. for common house coal, 9s. to 9s. 6d. and 10s. for steam and forge coal, and from 5s. to 5s. 3d. for common and 7s. to 7s. 6d. for better qualities of Lancashire slack. The shipping demand continues good, with a slight improvement in prices; 10s. 3d. to 10s. 6d. per ton representing the minimum quotations for ordinary steam coal, delivered at the Mersey ports. For coke, a fairly active demand comes forward, with prices steady at about late rates. Best Lancashire foundry cokes are from 22s. to 24s. per ton, and washed furnace cokes from 13s. up to 15s. at the ovens.

Northern Coal Trade.—There has been some interruption in the shipment of coals, steamers having been delayed by the stormy weather; but there has been more settled work, and contract quantities are being sent well forward. Best Northumbrian steams are lower at 10s. 6d. to 11s. per ton f.o.b., unscreened steams are 9s., and steam smalls 6s.—the latter being scarce, and rather firm. In the gas coal trade, there is now a very heavy demand; and deliveries are full. The price of Durham gas coals varies somewhat more than usual. For occasional cargoes, for prompt delivery, 12s. to 12s. 6d. per ton f.o.b. is asked; but for forward contracts the price is nearly 2s. 6d. below this. This is the time of pressure; and for a month or six weeks that will influence the price for occasional cargoes. In the coke trade, there is a steady inquiry. Best Durham coke is now 18s. to 18s. 6d. per ton f.o.b., blast-furnace coke is unaltered at 17s. at the furnaces, and gas coke is fairly steady, though the output is now very large. About 13s. per ton f.o.b. is the current quotation for gas coke on the Newcastle Exchange.

Scotch Coal Trade.—The difficulty of traders in Scotland still is that the price of coal in the North of England remains cheaper by about 1s. per ton than it is over the border, and that there is no saying what may happen in Wales. The probability is that prices in Scotland will go down a little yet. The quotations are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 3d. to 11s. 3d., and splint 10s. 9d. to 11s. The shipments for the week amounted to 184,581 tons—a decrease of 18,630 tons upon the previous week, and of 21,885 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,781,434 tons—a decrease of 991,781 tons upon the same period of last year.

To meet their recent heavy capital expenditure, the Directors of the Marlow Water Company have decided to issue a further 300 £10 additional shares.

London County Council and Water Gas.—At the meetng of the London County Council last Tuesday, the recommendation of the Public Control Committee, in regard to continuing the tests for water gas, to which reference was made in the "JOURNAL" on that day (p. 1331), was agreed to.

Strike of Gas Workers in Milan.—According to a telegram from the correspondent of the "Daily Telegraph" in Milan, all the workmen employed by the Gas Company (the French Company, the Union des Gaz) went out on strike last Thursday morning, and appealed to their fellows engaged at the works in the other towns served by the Company (Genoa and Alessandria) for support, to which they responded by immediately leaving their duties. The cause of the strike, in which several thousand men are taking part, is said to be a demand for higher wages. Peasants have, it is stated, been engaged to look after the street lighting. Telegraphing on Saturday, the Milan correspondent of the "Pall Mall Gazette," referring to the strike, said that from the point of view of night illumination the matter was serious enough, seeing that, so far as the streets were concerned, about a million persons would be plunged into darkness, and placed at the oil vendors' mercy. At this season of the year, however, heating and cooking were of even more importance; and as soon as the strike became quite general, the plight of that vast population, who depended to a large extent upon gas-stoves, would be almost pitiable. It appears that the Municipalities are exerting themselves to the utmost to promote a pacification.

Lambeth Water-Works Company.—In the "JOURNAL" for the 5th inst., a brief indication was given of the result of the working of the above-named Company in the six months ending the 30th of September. We learn from the report of the Directors for this period, which has since been issued, that 2271 houses and other supplies of water, estimated to yield an annual rental of £5203, were connected with the Company's works, against 2239 houses, &c., producing a rental of £4934 laid on in the six summer months of 1900. The revenue account, compared with the corresponding period of last year, exhibits an increase of £7202 in water-rents, &c., and of £7117 in the ordinary expenditure. Of the augmented expenditure, no less than £3166 occurs under the head of rates and taxes, due in part to a large addition to the rateable value of the Company's property, and in part to an almost general advance in the amount of the rates. The surplus transferred to the dividend and interest account is £88,301. There is to the credit of that account, after payment of interest on debenture stock and expenses in respect of works of intercommunication, an available balance of £83,404. The Directors have decided to transfer the sum of £2000 to the contingency fund (which will then amount to £50,000); and they recommend that dividends at the prescribed rates of 10 and 7½ per cent. per annum respectively be paid on the 10 and 7½ per cent. stock, together with a payment on both descriptions of stock of 5s. per cent. (being at the rate of ½ per cent. per annum) on account of deficiencies of previous dividends. A balance of £6746 will remain to be carried forward, after making provision for the payment of £3609 to the Chamberlain of the City of London, under the sinking-fund clauses of the Company's Acts.

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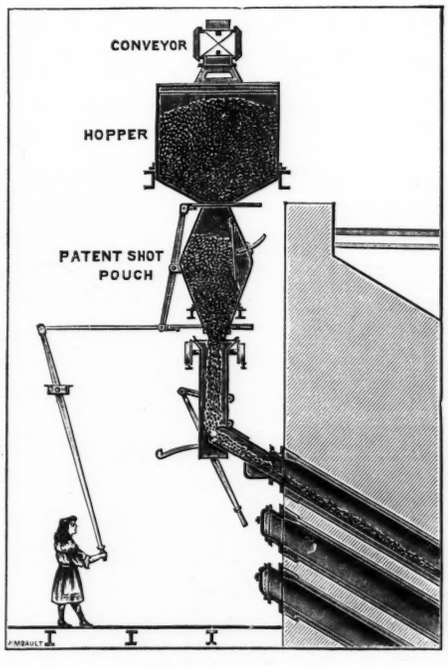

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Boring Operations at Scunthorpe Unsuccessful.—At the last monthly meeting of the Scunthorpe District Council, the Surveyor (Mr. A. Macdonald Cobban) reported that the pumping tests at the borehole were completed on the 4th inst., and during the 14 days they had been in progress there had been raised 2,830,000 gallons of water, samples of which had been submitted after 7 and also after 14 days' pumping. He regretted to say the water had been found unsuitable for drinking purposes. Mr. E. H. Stevenson (Messrs. Stevenson and Burstal, the Engineers to the Council) wrote stating that, although it was free from organic contamination, the water was far too saline for use as a town's supply, and apparently nothing could be done to change its chemical composition. He therefore advised the Council to abandon the work, and go on elsewhere. Dr. Muter, the County Analyst, wrote stating that the high saline contents of the water rendered it unsuitable for a public supply; and Messrs. Stanger and Blount, who had also analyzed the water, confirmed this opinion. It was resolved to send copies of the analyses to Mr. Atkinson (Brigg), Professor Boyd Dawkins, and to the authorities at Lincoln, where similar boring operations are in progress; and the reports were referred to the Water Committee, with power to form a small Committee to select a suitable place for another trial.

Portsmouth Water Company.—The report of the Directors of this Company for the half year ended Sept. 30 sets forth that the available balance on the profit and loss account is £26 525, out of which they recommend the payment of the full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £10,350 to be carried forward. During the half year, 2676 yards of additional street service mains were laid in new roads; making a total of about 51 miles of trunk, and 131 miles of service mains. The number of additional services connected with the mains was 459; making the total number of premises now under constant supply by the Company 41,167. The quantity of water pumped from Havant and Bedhampton in the six months was 1,513,421,000 gallons, or an average daily supply for all purposes of 8,315,000 gallons; being an increase of 475,000 gallons daily, as compared with the corresponding period of last year. The quantity supplied for domestic use was equal to an average of about 28 gallons per diem per head of the population, exclusive of all supplies by meter. Reference is made to the proposal of the Portsmouth Corporation to purchase the Company's undertaking, and to the abandonment of the project owing to adverse criticism. The attention of the shareholders is called to the fact that, notwithstanding the drought throughout the country during the summer and autumn, the supply of water to the borough and the whole of the Company's districts was as constant and abundant as usual.

Brixham Water Supply.—A long report has been prepared by Mr. J. L. Arlidge, Clerk to the Brixham Urban District Council, on the steps taken to obtain an additional supply of water. The subject has been under consideration for about ten years; and the report details all the attempts which have been made since November, 1893, to discover means of providing an adequate supply. At present the Council have two alternative schemes before them. One proposal is to take water from the Paignton District Council, who are constructing works for obtaining a supply by gravitation from Dartmoor; the other is to make a large storage reservoir for collecting water at a local source. The Paignton District Council are willing to enter into an agreement to supply Brixham with water for 50 years, at the price of 6d. per 1000 gallons; the minimum quantity to be 75,000 gallons, and the maximum 200,000 gallons a day. Paignton will lay a 6-inch main to the boundary of their district, and will concede to the Brixham Council permission to supply neighbouring villages. In order to avail themselves of this scheme, the Brixham Council would have to incur an expenditure of £3500 on mains, reservoir, easements, &c. The alternative proposal, as reported upon by Mr. F. W. Vanstone, is to make a storage reservoir with a capacity of over 13,000,000 gallons. It is calculated that there is a deficiency of 85,000 gallons a day in the present supply during the summer and autumn, and that the yield of the springs during the remaining period of the year is sufficient, if stored, to meet this need. The cost of the reservoir, mains, pumps, engines, &c., would be about £16,600; and if the money is borrowed for fifty years at 3½ per cent., the annual cost of repayment will be £707, while the pumping will cost £75. If the Paignton scheme is adopted, the annual charge for a minimum supply of 75,000 gallons a day will be £684, and the amount required as interest and principal on the capital outlay will be £149. The difference in favour of the local scheme is equal to a rate of 1d. in the pound; and while in the case of this proposal the capital outlay will be discharged in fifty years, the annual charge for Paignton water will continue at the end of that period.

The Leeds Water Committee have accepted the contract of the Staveley Iron Company for 1000 yards of 48-inch pipes, and that of Messrs. Blakeborough and Sons for large valves for same.

The Manchester Gas Committee have resolved to accept tenders for 15,000 tons of gas oil at prices about 50 per cent. below those paid last year. The saving that will be effected by the reduced cost is put at about £40,000. This remarkable fall is attributed to the severe competition in the oil trade.

Messrs. Wilson and Mathieson, Limited, of Leeds and London furnished the gas-cooking appliances at an exhibition recently held in the Victoria Hall, Queensbury, under the auspices of Messrs. J. Foster and Son, Limited; and in connection therewith Mrs. C. F. Pitcher gave practical demonstrations of the utility of the stoves.

Those of our readers who are interested in the large sale of Bristol gas stock on Thursday, by Messrs. Geo. Nichols, Howes, Young, Alder, and Co., to which attention was called in the "JOURNAL" for the 5th inst., will possibly be glad to be informed that the Directors have fixed £116 as the minimum price for the £25,000 of general capital stock, bearing a maximum dividend of 5 per cent., and £105 for the £8000 of new 4 per cent. debenture stock. The stocks will be put up in £100 lots.

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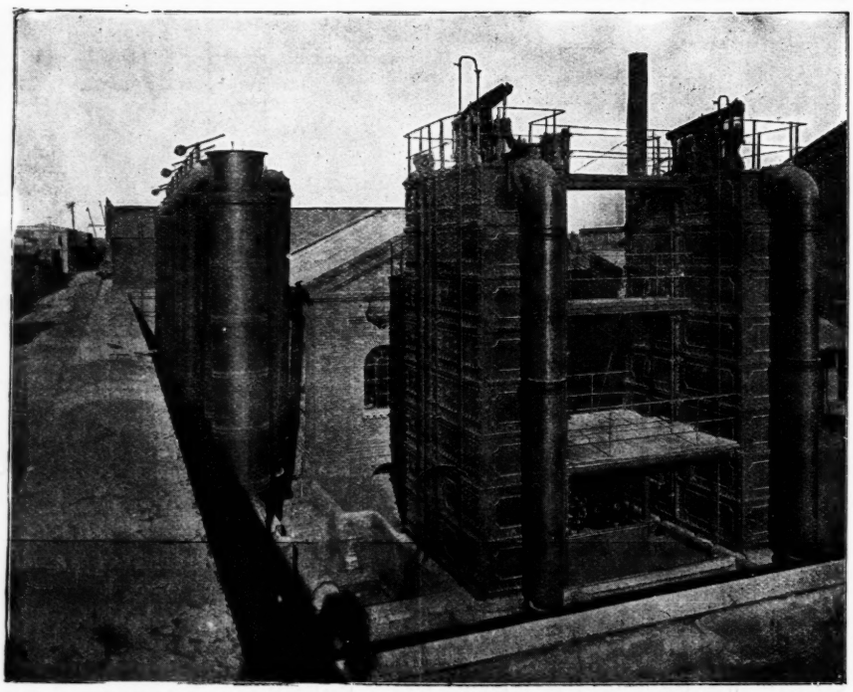
THE PURIFYING MACHINES REMOVE THE WHOLE OF THE AMMONIA AND TAR FROM THE CRUDE GAS TOGETHER WITH UPWARDS OF 50% OF THE CO_2 AND H_2S.



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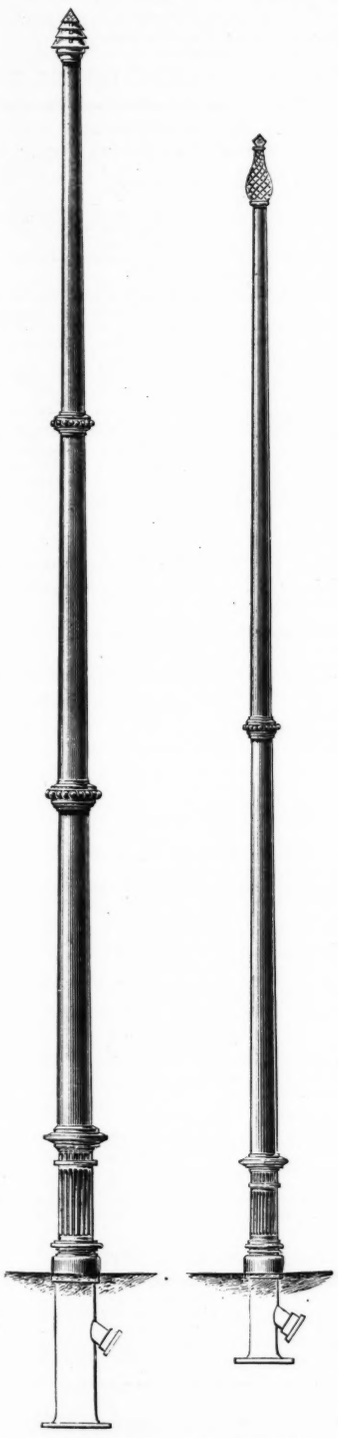
WALKER'S PATENT CONDENSER AND PURIFYING MACHINE AT SANTIAGO GAS-WORKS.

SEWER VENTILATING SHAFTS.

Some of the sewer ventilating-shafts which one meets with in taking walks abroad, while designed for a good purpose, have the disadvantage of being somewhat repelling in appearance. Their very duty is not sufficiently inviting to cause one to have any special desire to linger longer than is necessary in their particular vicinity; and when to this is added a round, plain, squat looking figure, one is disposed to look upon them with a certain amount of contempt. If increased in length, with their proportions maintained, while perhaps adding to their usefulness, their appearance is more hideous still. Speaking of the length, some people regard many of the existing ventilating-shafts as being very deficient in that respect; their height not being sufficient to carry above the houses in the neighbourhood the gases from the sewers. And therefore the very instruments which are intended to dissipate the gases at a level where they can have no evil influence, altogether fail in their object.



Now in both these respects—the æsthetic and the safe—Mr. Joseph Aird, of the Wellington Tube Works, Great Bridge, Staffs., meets tastes and requirements with his new tubular ventilating standards. The illustrations show that there is nothing distressingly ugly about them; but, on the contrary, they present to the eye an elegant clean cut figure. And at the same time, as the columns are built up in sections of wrought iron or mild steel tubes, they can be economically carried to any height that fancy dictates or necessity demands. We have before us a detailed drawing of a shaft actually erected; and some measurements from it will convey an idea of the finished structure. This particular shaft is 35 feet long, and has a 9-inch diameter root sunk 3 feet underground, from the side of which runs the branch for junction with the sewer. At the ground level, it has a shallow foot base 12 inches diameter, surmounted by a cast-iron ornamental pillar about 3 feet in length, and $8\frac{1}{2}$ inches in diameter. From this ascends the column in sections; its diameter being some 6 inches for about half its length, and $5\frac{1}{2}$ inches for the other $17\frac{1}{2}$ feet. The shaft is capped by a galvanized wire-wove basket.

Although slight and graceful (so far as grace can be imparted to columns of this character), the shafts are strongly made; special attention being given to securing a firm joint between the different lengths of piping. These junctions are covered with ornamental rings, which enhance the effect. We can only hope that these tubular ventilating-shafts will soon replace the unsightly structures which do duty in some of the prettiest of our suburban and provincial towns, and that their adoption will become general in other and new localities. They are frequently adopted as combined sewer ventilators and telephone or telegraph poles. Engineers and surveyors will find that these tubular ventilators meet a sanitary requirement, and in a way which will disarm criticism.

Proposed Amalgamation of the Bournemouth and Poole Gas Companies.—A special meeting of the Bournemouth Gas and Water Company has been called at the London Offices on the 6th prox., to consider a resolution sanctioning the amalgamation of the Company with the Poole Gas and Coke Company, Limited, on the terms of a provisional agreement entered into between the two Companies.

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* Names on Application.

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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

WANTED, by Advertiser (disengaged), a Situation in GAS-RENTAL OFFICE. Seven years' experience in the Rental Department of a Large Gas Undertaking near London. Appointment in or near London preferred. Excellent Testimonials.

Address W. MATTHEWS, 4, Chesthunt Terrace, WALTHAM CROSS.

WANTED, by a Provincial Gas Company, a Working OUT-DOOR FOREMAN for Mains, Services, Public Lighting, Slot Meters, &c.

Apply, by letter, No. 3782, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a Gas-Fitter, used to Iron and Compo. and the general run of Gas-Fitting.

Apply, giving References and Wages required, to J. DAVIES, Manager, Gas-Works, NANTWICH.

WANTED, a Young Man who can lay Services, Fix Meters, and do general Pipe Work in a Gas-Works. Applicant must state Age, Experience, and Wages expected.

Apply to the ENNISKILLEN GAS COMPANY, IRELAND.

GAS-STOVE FOUNDRY.

SMART Man to take a responsible position. Must thoroughly understand the production of high-class fine Castings, and be able to undertake the management if necessary. Every assistance would be given to a good Man, with large Experience.

Apply, by letter, with full Particulars, to No. 3783, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gas-Works Fitter, used to Iron and Compo., Meter Fixing, Index Taking, Incandescent Burners, &c. Wages 32s. per week (Permanency). Works 17 miles from London.

Apply, by letter, to No. 3785, care of Mr. King, 11 Bolt Court, FLEET STREET, E.C.

WANTED, a Man to set Retorts and do general Bricklaying at Works near Birmingham. Must be used to Regenerative Settings. Permanent Situation to suitable Man.

State Age, Experience, Wages required, &c., to No. 3753, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

REQUIRED, the services of a well-EDUCATED LADY, capable, and of pleasing manners, to undertake the control of our new Showroom at Devonport. Accurate in figures, fluent in testimony, good Saleswoman of apparatus appertaining to artificial light, able to cook by Gas, &c.

Apply WILLEY AND CO., Engineers, EXETER.

WANTED, a Store and Time Keeper for a Water and Gas Company. Would be required to keep all books connected with his work, and make himself generally useful. Must have a practical knowledge of Water and Gas Fittings.

Applications, in Man's own Handwriting, stating Age and Wages required, accompanied by *copies* of three recent Testimonials, to No. 3780, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS MANAGER WANTED.

WANTED, by the Arbroath Gas Corporation, a properly qualified person to act as MANAGER of their Works, which include Sulphate Plant. To enter upon his duties on Wednesday, the 1st of January next, or as soon thereafter as can be arranged.

Salary £200 per annum, with Free House, Coals, Gas, and Taxes (except Income-Tax).

Further Particulars may be obtained on application to David Chapel, Solicitor, Arbroath, Clerk to the Corporation, with whom Applications and eighteen *copies* of Testimonials are to be lodged on or before the 5th of December next.

Arbroath, Nov. 19, 1901.

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.

Send for full Particulars to
BALE & CO., 120 & 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."
Telephone "277 HOLBORN."

GAS-STOVES.

WANTED, by a leading Firm of Gas-Stove Makers, an experienced and capable Man to take CHARGE of PATTERN SHOP, and to act as Expert in introducing New Goods. Must have a thorough knowledge of the Business.

Apply, giving Particulars of Experience, Age, Salary, &c., to No. 3781, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas and Water Company in the South of England, a smart, energetic man as OUTSIDE DISTRICT SUPERINTENDENT, capable of taking charge of Distribution, Main and Service laying, Fitting and Plumbing in all its branches, able to advise Consumers on Lighting and Heating, also Hot and Ordinary Water Supplies. Age not to exceed 40 years.

Submit application, giving fullest Information as to Experience, &c., with three recent Testimonials. Wages £2 a week with house.

Address No. 3784, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SHIREBROOK DISTRICT GAS COMPANY, NEAR MANSFIELD.

WANTED, immediately, a Blacksmith and FITTER used to Gas-Works. Must be able to lay Services, and make himself generally useful. Wages 28s. per week, and, if suitable, a permanency would be offered.

Apply, with References, stating Age and Experience, to

FRANCIS H. WOOD,
Manager.

Gas-Works, Shirebrook,
Near Mansfield, Nov. 16, 1901.

SHARES Wanted in C. & W. Walker, either Preference or Ordinary.

State Number for disposal and Price required to No. 3779, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Set (three or four) of good second-hand PURIFIERS complete; also TOWER SCRUBBER suitable for small Works of about Ten Millions per annum.

Particulars to the MANAGER, Gas-Works, WIDNES.

PURIFIERS.

WANTED, Second-Hand, Two Purifiers, about 30 to 36 superficial square feet area each, and Connections.

WILLIAM KEY.
109, Hope Street, Glasgow.

TO BE LET on Lease—The Charlbury GAS-WORKS, with Manager's Cottage and Coal-Wharf. Possession the 1st of April, 1902.

Sealed Tenders to be sent to the Honorary Secretary, G. MORRIS, CHARLBURY, on or before the 31st day of December next.

JOURNAL OF GAS LIGHTING, &c.

COMPLETE Set for disposal, Vols. 1 to 53 bound in cases; the remainder unbound. Also complete Set of TRANSACTIONS OF BRITISH ASSOCIATION of GAS MANAGERS and GAS INSTITUTE, in first-class condition.

Address offers to No. 3776, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO BE SOLD—

GASHOLDER (and Cast-Iron Tank), 17,500 cubic feet capacity.
CENTRE-VALVE, 15 in. diameter, by Walker, for Four Purifiers.
Four PURIFIERS, 10 feet square, in line, with Planed Joints, Walker Centre-Valve, Covers, and Traversing Crab Lifting Gear. Will be refixed equal to new.

Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

J. FIRTH BLAKELEY & CO., Thornhill, Dewsbury, have FOR SALE cheap—

ANNULAR CONDENSERS up to 16-in. Connections.
EXHAUSTERS and ENGINES up to 60,000 feet per hour.
"HOLMES" and "CLAPHAM" WASHERS and TOWER-SCRUBBERS.
GASHOLDERS, 15 ft., 25 ft., 30 ft., and 50 ft. diam.
PURIFIERS, sets of 6 ft., 8 ft., 10 ft., 12 ft., and 20 ft. square.

J. F. B. & Co., are the largest Buyers and Dealers in SECOND-HAND GAS PLANT, and have an extensive Stock. Inquiries solicited from both Vendors and Purchasers of the same.

FOR SALE—Twenty-four Lamp Columns and Wrought-Iron Scrolls. Good design. Six cwt. each. One Lamp Column, with 300-candle power Welsbach Arc Lamp; and one SUGG "LAMBETH" LANTERN.

For Photographs and Particulars, apply to H. WIMHURST, Gas-Works, SLEAFORD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

SULPHURIC ACID.

TENDERS invited for the supply of about 100 Tons of BRIMSTONE ACID during 1902 as required, and to include use of Carboys and delivery f.o.r. Salisbury.

N. H. HUMPHRYS, Gas-Works, SALISBURY.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.

TENDERS FOR TAR.

THE Directors of this Company invite TENDERS for the purchase of the TAR to be produced at their Works during the Year 1902.

The Contractor to provide Casks, and to accept delivery at Blackhill Station.

Tenders will be received not later than Dec. 11, 1901.

Quantity produced about 70,000 Gallons.

M. RICHLEY,
Secretary.

Gas Offices, Shotley Bridge,
Nov. 20, 1901.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and erection of Three additional PURIFIERS, with Elevator and Conveyor, also VALVES and CONNECTIONS, on their Gas-Works.

Drawings may be seen, and Specifications had, on application to the undersigned.

Tenders to be sent in as per Specification on or before Dec. 17, 1901.

By order,
WM. NORTH,
Engineer and Manager.

Gas-Works, Stourbridge,
Nov. 23, 1901.

ALDERSHOT GAS AND WATER COMPANY.

THE Directors are prepared to con- sider TENDERS for the purchase of surplus TAR (about 1000 Tons) produced at their Gas-Works, Ash Road, Aldershot (Tongham Station, L.S.W. Rly.), and North Camp, S.E. Rly., for a Year from Jan. 1, 1902, to Dec. 31, 1902.

Specification and Conditions can be obtained on application.

Tenders to be sent in to the undersigned, endorsed "Purchase of Surplus Tar," to arrive not later than Nine a.m., Friday, Dec. 6, 1901.

The highest or any Tender not necessarily accepted.

By order,
R. W. EDWARDS,
Secretary.

Nov. 23, 1901.

ALDERSHOT GAS AND WATER COMPANY.

THE Directors are prepared to con- sider TENDERS for the supply of best SULPHURIC ACID, delivered in Tank-Waggons (or Carboys, if necessary) to Tongham Siding, L.S.W. Rly.

Particulars on application.

Tenders to be sent in to the undersigned to arrive not later than Nine a.m., Friday, Dec. 6, marked "Sulphuric Acid."

The lowest or any Tender not necessarily accepted.

By order,
R. W. EDWARDS,
Secretary.

URBAN DISTRICT COUNCIL OF PADIHAM.

(GAS DEPARTMENT.)

IRONWORK.

TENDERS invited for the supply and delivery of RETORT-FITTINGS, and all necessary IRONWORK, to be delivered at the Gas-Works, Padiham.

Forms of Tender and full Particulars may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Ironwork," to be sent to the Chairman of the Gas Committee not later than the 4th day of December, 1902.

A. J. JACKSON,
Manager.

Gas-Works, Padiham,
Nov. 19, 1901.

URBAN DISTRICT COUNCIL OF PADIHAM.

(GAS DEPARTMENT.)

FIRE-CLAY GOODS.

TENDERS invited for the supply and delivery of Machine-made RETORTS, FIRE-BRICKS, and FIRE-CLAY, all to be delivered at the Gas-Works, Padiham.

Forms of Tender and full Particulars may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Fire-Clay Goods," to be sent to the Chairman of the Gas Committee, not later than the 4th day of December, 1902.

A. J. JACKSON,
Manager.

Gas-Works, Padiham,
Nov. 19, 1901.

THE Bridgewater Trustees are pre- pared to receive TENDERS for the TAR produced at their Coke-Works for a period of Six or Twelve Months, from the 1st of January next, delivered into Contractor's Tanks at the Trustees' Brackley Siding on the Little Hulton Mineral Branch of the L. & N.W. Railway; or their Wharton Hall Siding on the Pendleton and Hindley Branch of the L. & Y. Railway.

Tenders, endorsed "Tender for Tar," to be addressed to the Bridgewater Trustees, 4, Chapel Walks, Manchester, and to be delivered on or before the 30th of November.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of SILICA and FIRE-CLAY GOODS, required at their Neepsend, Effingham Street, and Grimesthorpe Stations during the next Twelve Months.

Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. J. W. Morrison.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered by post to the undersigned not later than the first post on Saturday, Nov. 30.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street,
Sheffield, Nov. 11, 1901.

CHELSEA WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY GENERAL MEETING of the Governor and Company of Chelsea Water-Works will be held at their Office, Commercial Road, Pimlico, in the County of London, on Thursday, the 19th day of December prox., at One o'clock in the Afternoon precisely, for the General Business of the Company.

The REGISTER of TRANSFERS WILL BE CLOSED between the 7th day of December prox., and the 19th day of December prox., both days inclusive.

By order,
G. H. GILL,
Secretary.

London, Nov. 23, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £4805 ADDITIONAL "B" CONSOLIDATED STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, Dec. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

WEST HAM GAS COMPANY.

153 £5 ORIGINAL SHARES
AND
173 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, Dec. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the

WITNEY GASLIGHT AND COKE COMPANY, LIMITED.

NEW ISSUE OF 156 £5 SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, Dec. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £4000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK AND 300 £10 NEW ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION at the Mart, E.C., on Monday, Dec. 2, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

ILFORD GAS COMPANY.

NEW ISSUE OF £10,000 ORDINARY "C" STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, Dec. 9, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE KITSON LIGHTING COMPANY OF GREAT BRITAIN, LIMITED.

IN order to correct a misapprehension on the part of many of our customers and others, NOTICE IS HEREBY GIVEN that the business of THE KITSON LIGHTING AND HEATING SYNDICATE, LTD., is being carried on at No. 1, VICTORIA EMBANKMENT, Blackfriars, E.C., by this Company, who have PURCHASED the PATENTS and UNDERTAKING of the said Kitson Lighting and Heating Syndicate, Ltd., which latter, in consequence of the Sale of their Business, have since gone into voluntary liquidation.

The Company will shortly occupy its NEW WORKS at Coventry, formerly occupied by the Beeston Cycle Company, when it will be in a position to cope with the large volume of orders received during the past few months.

For the KITSON LIGHTING COMPANY OF GREAT BRITAIN, LIMITED.
H. C. FIDGEON,
Secretary.

Dated 15th November, 1901.

KINVER GAS COMPANY, LIMITED.

The Liquidator of this Company invites
TENDERS
FOR THE PURCHASE OF THE
KINVER GAS-WORKS as a Going Concern.

THE Works are Leasehold for 99 Years, having 58 years still to run, at the annual rent of £10.

The Erections consist of a Retort-House, Foreman's House, Gasholder, Retort-Beds, and Wooden Stabling.

The Plant and Fixtures are also included in the sale.

Particulars and Forms of Tender may be had on application on or about Friday, the 22nd inst., and afterwards Sealed Tenders to be sent in to Mr. T. H. Gough, the Liquidator, at his Offices, 267, Castle Street, Dudley, on or before Twelve o'clock Friday, the 13th of December, 1901.

For any further Information, apply

Mr. T. H. GOUGH,
Liquidator,
267, Castle Street, DUDLEY; or
Messrs. WALL and JAMES,
Solicitors, STOURBRIDGE.

SOUTH SHIELDS GAS COMPANY.

IMPORTANT SALE OF GAS STOCK.

MR. M. STAINTON
is instructed by the Gas Company to
SELL BY PUBLIC AUCTION
AT THE
OFFICES OF THE COMPANY,
CHAPTER ROW, SOUTH SHIELDS,
ON TUESDAY, DEC. 3, 1901,
at 12.40 o'clock, p.m.,
£8000 OF NEW STOCK
UNDER THE SOUTH SHIELDS GAS ACT, 1886.

THE Stock will be put up in Lots of £100 each, nominal value. A deposit of £10 per cent. to be paid on the purchase money at the sale, the remainder to be paid to the Company's Bankers, the North-Eastern Banking Company, Limited, King Street, South Shields, on or before the 31st of December next.

The Stock will be registered in the name of the purchaser free of expense, and will rank for Dividend from the 1st of January, 1902.

By order of the Directors,
J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, November, 1901.

SEVENOAKS GAS COMPANY.

28 £10 "A" SHARES, Dividends for many years past 10 per cent. per annum.

MESSRS. EDWIN FOX & BOUSFIELD will include in their next Auction of Stocks and Shares, at the Mart, on Wednesday, Dec. 4, at Two o'clock, in Lots, the ABOVE SHARES.

Particulars at the AUCTIONEERS' OFFICE, 99, Gresham Street, BANK, E.C.

By EDWIN FOX & BOUSFIELD.
AT THE AUCTION MART,
On Wednesday, Dec. 4, at Two o'clock, in Lots.

NEW RIVER.

UNQUESTIONABLY the choicest home investment of this or any other age. Parts of a
KING'S FREEHOLD SHARE

In this grand Corporation, the Dividend in respect of which for last year was £774. The revenue of the Company from Land and Water has doubled within the last 28 years, and the Income from a whole Share increased during that time from £1178 to about £2850. The Company possess large landed properties, including the Clerkenwell Estate of over 50 acres, covered with Buildings, the Leases of which begin to fall in in 1903, when the Rack-Rental comes into possession. Also

FIFTEEN £100 NEW SHARES

(Fully paid), the Dividend on which is 13¼ per cent. per annum.

Particulars at Messrs. EDWIN FOX and BOUSFIELD'S Office, 99, Gresham Street, BANK, E.C.; and of the Vendor's Solicitors, Messrs. HOLLAMS, SONS, COWARD, and HAWKSLEY, 30, MINCING LANE, E.C.; and Messrs. UPPERTON & Co., 14, LINCOLN'S INN FIELDS, W.C.

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Hot Bath for 3d. in Five Minutes.

Boiling Water in a Single Minute.

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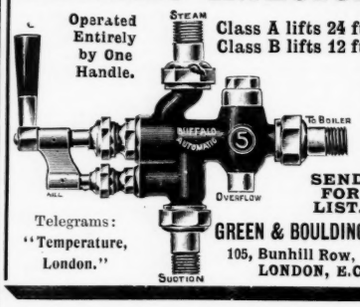

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Describing the Manufacture of Gas and

Its Application to the Purposes of Illumination.

By CHARLES HUNT,

Manager of the Birmingham Corporation Gas-Works.

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SULPHURIC ACID.

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Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

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Late of Cannon Street,

Works and Show Rooms:

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An exposition of the most modern, simple, and approved method of keeping gas accounts.

By **CHARLES SANDELL.**

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With List of Associations and Alphabetical List of Chairmen, Engineers, Managers, and Secretaries.

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With List of Associations and Alphabetical List of Chairmen, Managers, Engineers, and Secretaries.

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GEO. BOULTON & SON, Wholesale Glove Manufacturers, **75, Goswell Rd., London, E.C.**

Will be pleased to send Sample Patterns and Prices to the Managers and Engineers of Gas Companies, similar to those which have been supplied by them to the South Metropolitan Gas Co., The Gaslight and Coke Co., Commercial Gas Co., and others, for 30 years past.

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SEVERAL THOUSANDS OF OUR SETTINGS IN SUCCESSFUL WORK.

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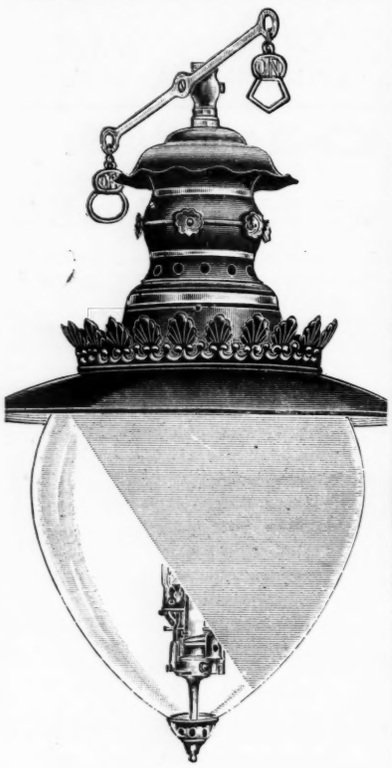

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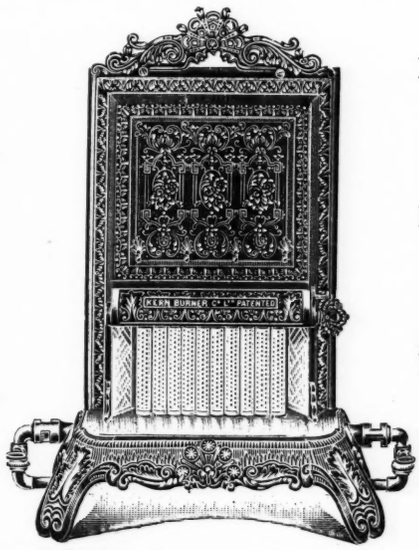

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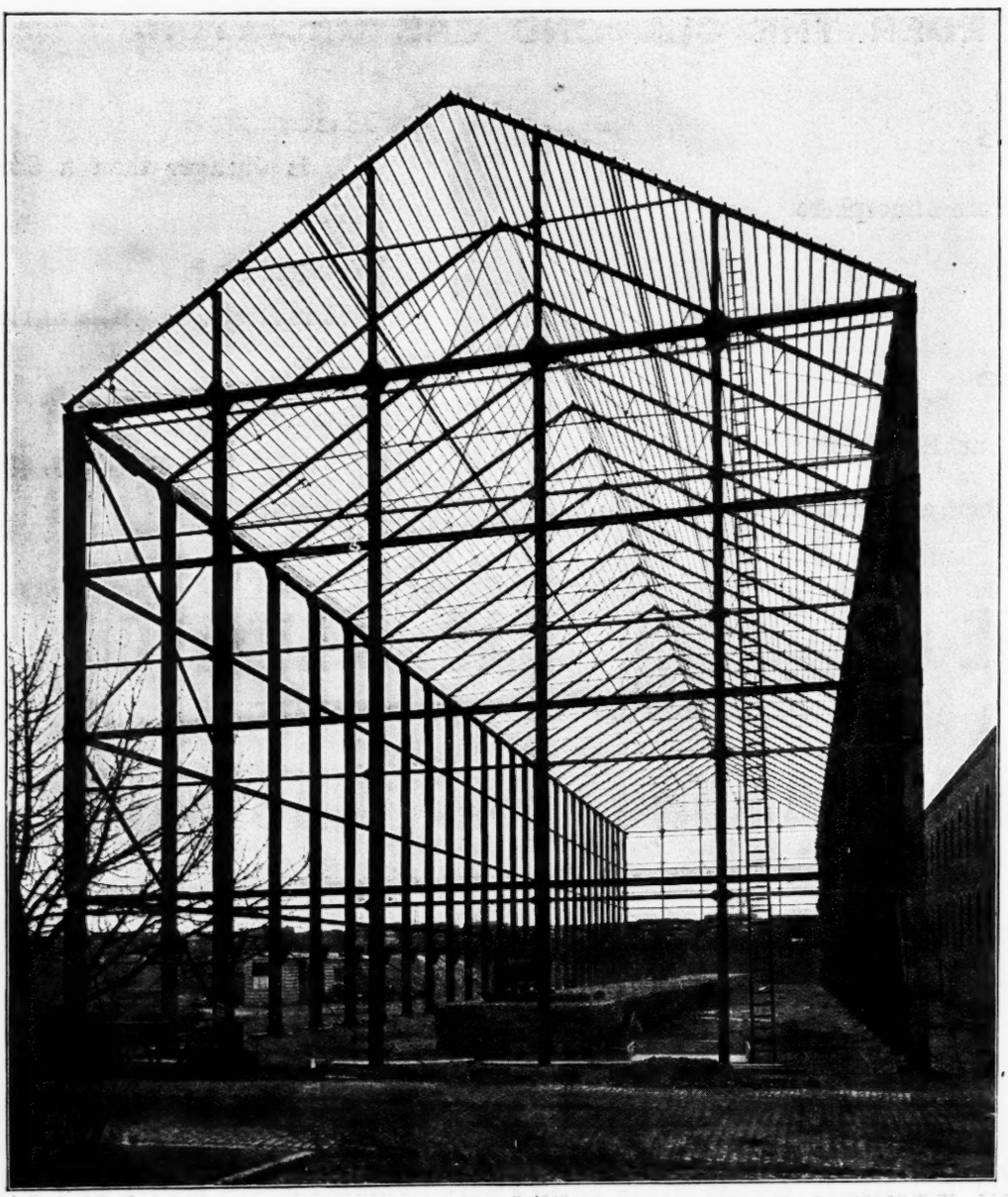

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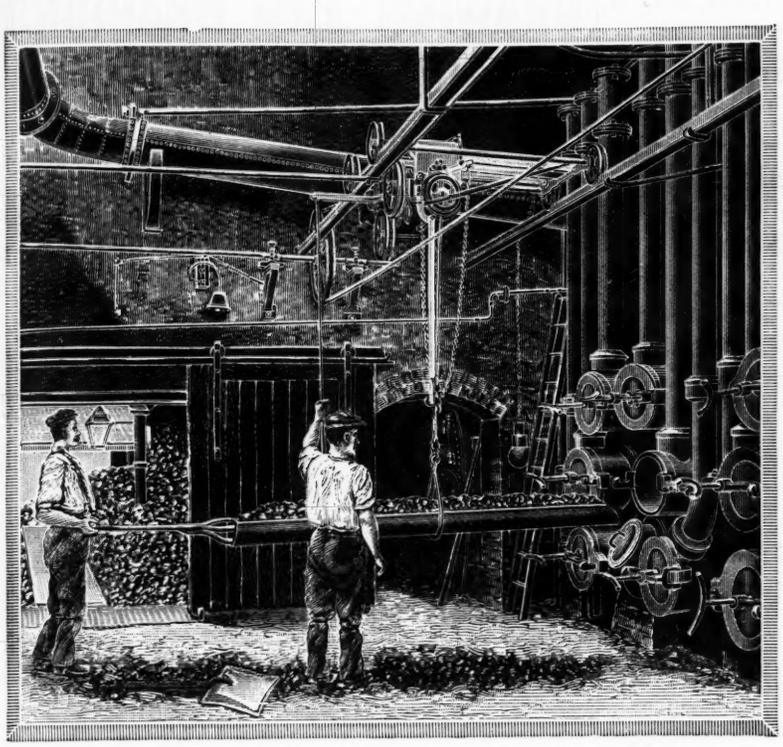

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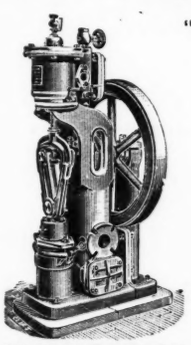

Fig. 705. "SINGLE RAM" STEAM-PUMP.

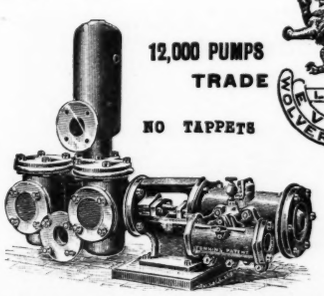

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

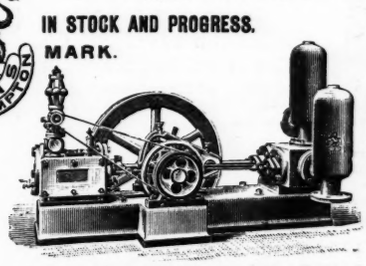

Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

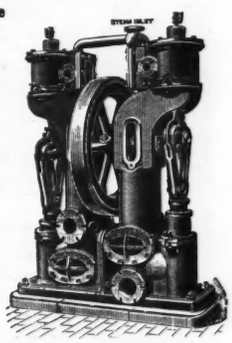

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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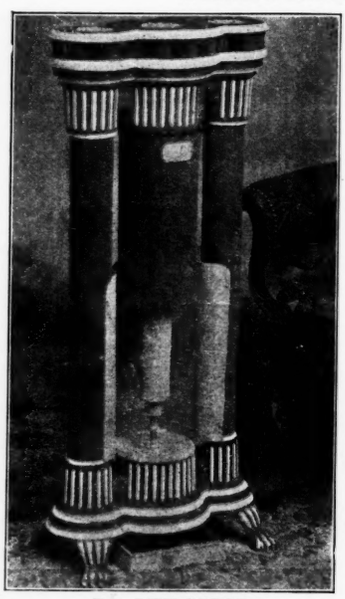

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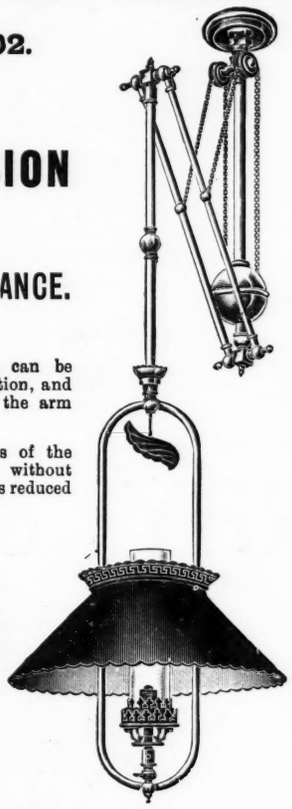

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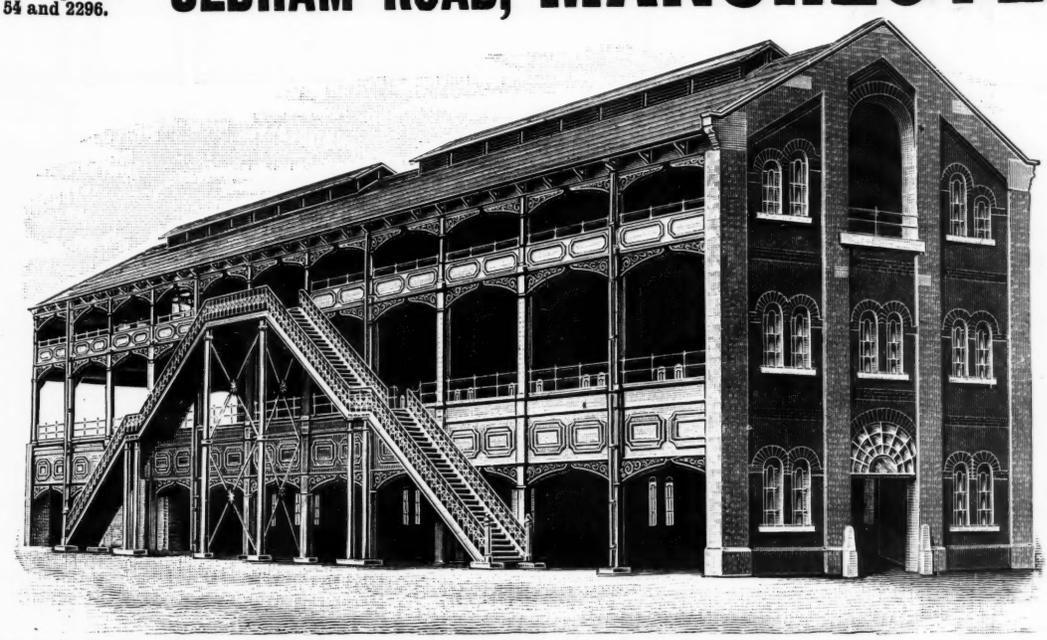

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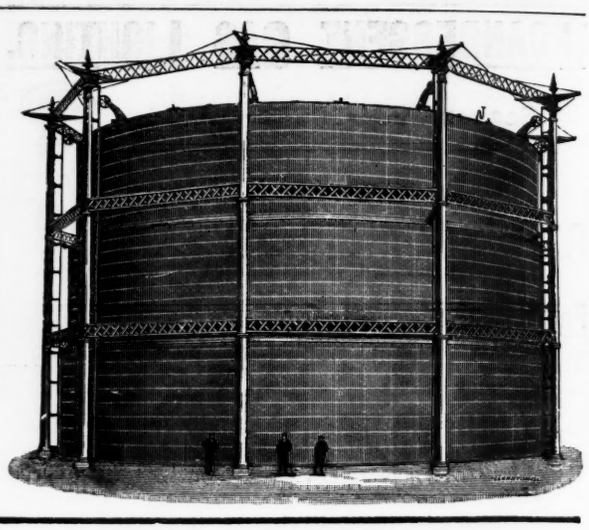

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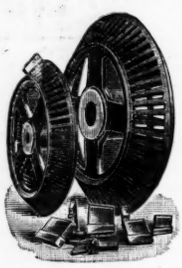

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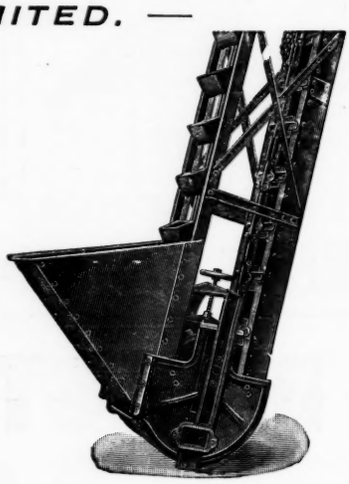

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